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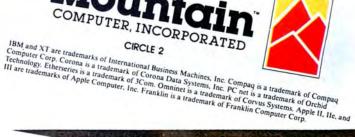
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CIRCLE 2

PERSONAL COMPUTING

FEATURES

It takes time and commitment to become computer literate—but once you've learned you'll never forget, and the results are worth the effort.
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DEPARTMENTS

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PERSONAL COMPUTING

What Do You Have To Say?

We have always tried to provide you with input on what else you can do with your personal computer. In recent months that task has become both easier and more difficult.

I say easier because so many manufacturers and software producers are introducing products that were specifically developed with you in mind. Two and a half years ago when we started writing to you in *Personal Computing,* the bulk of the product introductions were what I like to call "technological accidents." That is, some closet genius figured out that we could duplicate a function heretofore only available on much larger mainframe computers. Never mind that that particular application had little or nothing to do with the individual—the personal-computer user. Yes, there were exceptions: products like VisiCalc; and easy-to-use word-processors; and then, some data-base managers which were specifically designed for the individual; and graphics packages with enough hardware tie-ins so that they really were faster than an artist working at a board.

Today—and this is where our job gets tougher—almost every product introduced has already been measured for its likely acceptance by you. It is now very rare that a product reaches our pages (either as advertising or editorial) without careful testing—not only to get the bugs out, but for functionality and real ease-of-use. Picking the right product out of the mass of material we see is no small undertaking.

Our job is easier because there really is a lot more to share with you. So much so that it is becoming increasingly difficult to pick the very best from the wide selection. Since we try to focus on practical applications (where you do the practicing), we need your input.

The way we get your input is in our questions and answers section—you have the chance to ask about whatever might be puzzling you. (Not only that, but through your letters you may lead us to an interesting "People In Computing" subject— maybe even yourself.) Many of our feature articles often raise almost as many questions as they answer. Go ahead and ask them.

This month we've tried to deliver the kind of magazine that informs, stimulates, entertains, and most of all satisfies. Those, after all, were the reasons you paid for it. Dave Gabel's "advanced" article on data transfer between two dissimilar systems is the first in a series which will provide real, in-depth answers to your questions. The article on Persuasive Presentations—as well as the one on Effective Meetings—is directed at using your systems for your own profit. Improving your professional and managerial skills is really one of our most important tasks. Increasing your enjoyment is also very important here at *Personal Computing.* Let us know how well we did on the Playing Games article.

Finally, in both the cover story on Computing Literacy and the Essay, we take a shot at fulfilling our promise to keep you informed and intellectually stimulated.

You and lots of people like you have made *Personal Computing* the biggest magazine in the field—over 500,000 paid circulation. You have already voted with your dollars—you bought the magazine. Thank you. Now, we need your input to help make it serve you more directly. Let us hear exactly what else you would like us to deliver.

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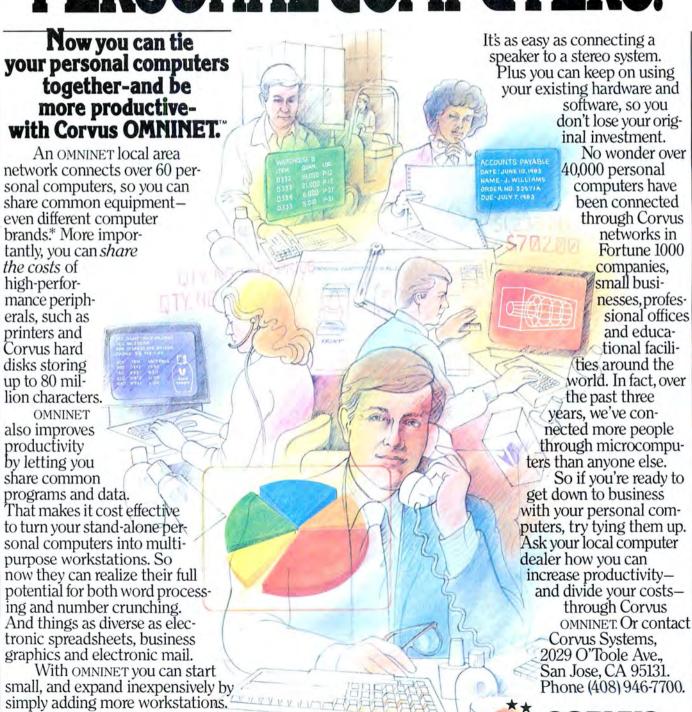
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CIRCLE 9

Tying it all together.

When The Computer Lags Behind

In this monthly column "Answers" we will respond to your most frequently asked general questions about personal computing. Please send your questions to: Answers, Personal Computing, 50 Essex St., Rochelle Park, NJ 07662.

Q. **When I'm using my word-processing program and I'm typing very quickly, I notice that I sometimes get ahead of the screen display—the program is several characters behind me. When I stop typing, it takes a second or two to display all the words I've typed. What's happening here? I thought computers were supposed to be faster than people.**

A. What's happening is a rather complex process your computer must go through every time you strike a key. The character you type is safely stored in a keyboard buffer, and it stays there until your word-processing program is ready to do something with it. When your program is ready, the first character in the buffer is removed and analyzed to determine whether it is a command to be executed by the program, or a character to be placed in your word-processing document. If the character is not a command, it is sent to a subroutine which routes it to a memory location associated with a specific position on the display screen.

Normally, this entire process seems to occur instantaneously, but on occasion it may run a little behind your typing speed. This has a lot to do with how your computer and/or word-processing program generates its display. For instance, both the Apple II's normal 40-character screen display and most 80-column boards for the Apple have memory-mapped displays and character sets stored on ROM chips. However, the routine that takes each character you type from the keyboard buffer and puts it on the screen is much more involved when you use an 80-column board, so some delay occurs there. Then too, the 80-column board must examine each character to see whether it is one of the board's control characters, so further delay occurs.

On the other hand, some word-processing programs for the Apple II generate a display of up to 70 columns, without requiring an 80-column board, by using the high-resolution graphics screen to display text. With these programs, the character set is contained in what is called a shape table. Every time you enter a character, the program must look up the appropriate figure for the character in the shape table and draw the correct shape, or image, on the screen. If you insert a character at the top of a screen already full of text, every character on the screen must be looked up again in the shape table and redrawn. Thus, it's easy to create a very noticeable delay as you enter text. Some of these programs allow you to keep the cursor at the bottom of the screen at all times, greatly speeding up text entry or editing.

Programs designed to be used on any CP/M-based machine are also prone to noticeable delays during text entry. The process of displaying a character on the screen with a CP/M machine is quite involved because the program author cannot make any assumptions about how the computer on which the program runs will display characters.

A more worrisome lapse in displaying the characters you type is occasionally encountered with word-processing programs that use your disk drive for virtual memory. These programs store parts of long documents on disk automatically as you enter the document, and so your disk drive may start spinning unexpectedly while you're entering text. At that point, your computer ignores the keyboard entirely for a second or so, and any characters you type in that time are lost. If waiting for the disk to stop spinning annoys you, you have two choices. One is to work with smaller files, and the other is to buy a buffer that sits between your keyboard and the rest of your computer and stores any text you enter while the disk drive is being used.

Q. **I have a small art studio, and I'm using a personal computer to handle various office functions. I've looked into several software packages which can generate graphics on a color monitor, and I'd like to use these graphics to create slides for our clients. Is there any easy way to photograph slides from the monitor?**

A. Photographing a video screen is tricky, since what you are seeing is not what's occurring on the screen. The video display is actually a fine beam of light, which turns on and off. This light beam moves rapidly across and down the screen at a speed which makes the characters on the display seem stationary. The shutter speed of the camera must be adjusted so that the shutter remains open for the entire scan of the light beam. If the shutter does not remain open for this length of time, only parts of the display will appear on the film. Another problem you have to overcome involves the quality of the

image reproduced from the video screen. Since the video display screen is made from curved glass, ambient light can cause major difficulties for the photographer. You may, however, want to look into a computer graphics camera called VideoSlide 35, which is designed to film slides of computer-generated displays. You can find out more about the camera from the manufacturer, Lang Systems, Inc., 1010 O'Brien Drive, Menlo Park, CA 94025; (415) 328-5555.

Q: I was thinking about purchasing a hard-disk system for my personal computer, but a friend mentioned that they're really not perfected yet, and the hard disks are prone to head crashes. Is he correct?

A: Head crashes did occur on older hard disks, but this problem has been resolved. The hard disk contains a head-disk assembly with a disk made from aluminum that has a magnetic-oxide coating. The read/write head floats over the disk surface on a cushion of air. This differs from a floppy disk drive where the read/write head is in direct contact with the disk. To prevent head crashes, most head-disk assemblies are now sealed to keep dust out of the assembly.

Q: I want to get an Epson QX-10, but the only available software is the package that comes with the machine. Why is this?

A: The development of third-party software really depends on how well the machine is selling. Manufacturers will usually include some software with their computers. If other manufacturers supply software compatible with a particular machine, it's because the computer is a popular one. Programmers will write software for machines that are popular because they reason such

software will sell lots of copies, and the author will, therefore, make a lot of money. As the Epson computer succeeds in the market, you should see more software becoming available for it.

Q: I own an IBM Personal Computer and have been wondering what to do if it breaks down. Would I have to take the whole computer back to the IBM store?

A: If you have a small IBM Personal Computer system, you'll have to take the computer back to the place where you purchased it. Owning a larger system should give you more leverage in getting in-office service. But pretty soon you might be able to handle some of the repairs yourself. IBM may soon release software which will enable users to diagnose malfunctions and replace parts themselves.

Q: I'm interested in computer law, but I'm having trouble getting information about it. I would appreciate any information or sources of information that you could bring to light regarding computer law—its scope, applications, prospective growth, etc.

A: The primary reason it's somewhat difficult to find general information about computer law is that many important aspects of the field are relatively new. Computer law, as it concerns negotiating contracts with vendors of hardware and software, has existed as long as mainframes have been around. However, computer law is now coming into special prominence because personal computers are putting the power of computing, and of accessing information, into so many hands.

Most of the legal questions arising from the use of personal computers are being tried and tested for the first time. These questions are setting

precedents for the way personal computers are becoming integrated into our society. The hottest current areas of litigation concern protecting software from unauthorized copying—through copyrights, trade secrets, patents, licensing agreements, and the like. Other emerging issues center on how to keep information private and secure—especially if a personal computer is linked to a data base or to other computers in a network. A rough guess is that there are about a thousand lawyers in the U.S. who practice some aspect of computer law. Many of them seem to feel that computer law is only now becoming rigorous. They also believe the field will increase in importance as personal computing becomes part of the American way of life.

In addition to the monthly law column here in *Personal Computing*, there are several other sources you can consult. A brief sampling follows.

A central clearinghouse of information about computer law is the Computer Law Association, which can be contacted through its secretary, Daniel T. Brooks, at Computer Law Advisers, 6106 Lorcom Court, Springfield, VA 22152. Since 1972, the Computer Law Association has sponsored seminars on legal issues arising from the technological revolutions in computers and communications.

Several journals specialize in computer law, usually for legal professionals. One is the *Rutgers Journal on Computers, Technology and the Law,* which is published twice a year, and covers all aspects of computer technology and its impact on the law. It is published by the Rutgers University Law School, 15 Washington Street, Newark, NJ 07102. Another is the *Computer Law Reporter,* published six times a year by Computer Law Reporter, Inc., 1519 Connecticut Ave. NW, Suite 200, Washington, DC 20036. For people without formal legal training, a new, quarter-

ly, desk-top reference is *The Computer Law Monitor,* published by Research Publications, Inc., P.O. Box 9267, Asheville, NC 28815. More general information can also be found in occasional feature articles and columns published in various computer trade magazines and newspapers such as *Computerworld* and *InfoWorld.*

A number of books have been written on aspects of computer law. Here are several titles: *Your Computer and the Law,* by Robert Bigelow and Susan B. Nycum, Prentice-Hall, Englewood Cliffs, N.J.; *Law and the Computer,* by Michael C. Gemignani, CBI Publishing Co., Boston, Mass.; and *Legal Care for Your Software,* by Daniel Remer, Nolo Press, Berkeley, Calif.

Q: I've been having a problem with my disk drive, and I'm about to toss it out the window. When I use the drive I occasionally get input/output errors. I took the disk drive to my computer store, but they couldn't seem to find anything wrong with the drive or the cable. When I got it home it acted up again. Any suggestions?

A: There's a good chance you're experiencing electromagnetic energy interference from the flyback transformer in the video display. To avoid this problem, try keeping your disk drive on the side of the computer, and not directly below the display monitor.

Q: I recently heard about a new type of display monitor called a gas plasma monitor. What is it, and how does it work?

A: A gas plasma monitor contains a grid made up of tiny wires running between two flat, glass plates. These plates are filled with neon and argon gases, and then sealed. There are 737,280 intersections of wires on the grid, produc-

ing a resolution of 960 by 768 pixels. The monitor can be divided into as many as four sections to perform up to four different functions simultaneously. The gas plasma monitor produces a sharp orange display which is readable from almost any angle. That's the good news. Now for some bad news. The only gas plasma monitor on the market (sold by IBM) has a price tag of over $7000. Less expensive models are likely to follow.

Q: I need a better modem program. I own a Heath/Zenith H89 running CP/M and H-DOS. My modem program—Modem 7—permits exchange of information between my system and another system, but does not permit the data on the screen to be saved or sent to the printer. Is there a modem program for use under CP/M and/or H-DOS which will permit me to actually capture data?

A: The Campbell, Calif. Heathkit Electronic Center recommends Reach, from Software Toolworks in Sherman Oaks, Calif.—available from many Heath stores for $19.95. That gets you either the CP/M or the H-DOS version. Double that figure if you want both. The Heath center also mentioned C-Link from Software Wizardry of St. Charles, Mo., for $39.95.

Q: Six months ago I bought a personal computer. Now I want to start buying some software. What bothers me is that I have to buy most of the packages sight unseen—I can't try them out before I buy. And if I don't like the package once I've used it, it's tough luck for me. It's the same whether I buy at the computer store, or through the mail. What can I do?

A: Welcome to the personal computer world! Buying software that can't be returned is a real problem. Since some software can easily

be copied by a buyer, store owners and software manufacturers are reluctant to accept returns. There are two things you can try which might help. First, you can look into software that offers a preview package; you pay a portion of the package price to see a sample of the program. If you decide to buy the package you pay an additional sum, and the manufacturer provides you with a code to release the full program, which is contained on the same disk. If you choose not to buy the program, you're out the price of the sample. Another approach is to read software reviews and make purchases based on the reviews. Of course, you can still make a mistake, but at least you'll have a better idea of what you're buying before you buy it.

Q: How does a high-level language convert a user's instructions into machine language?

A: There are two basic methods used. High-level languages either interpret the statements, or compile them.

A language that interprets does the interpreting at run time, the time that the program is to be executed. A compiler converts the statements first, then loads the result for execution.

But before the language can do the conversion, it has to check syntax. If the statement to be translated doesn't follow the rules of the language, then the translator part of the language won't be able to understand what the user meant. If an interpreted language encounters a syntax error, it stops interpreting and tells the user it found an error.

After a compiler finds an error, it usually logs it in an error file and attempts to continue compilation. The next step is the actual translation. It won't translate statements with syntax errors, but it can trans-

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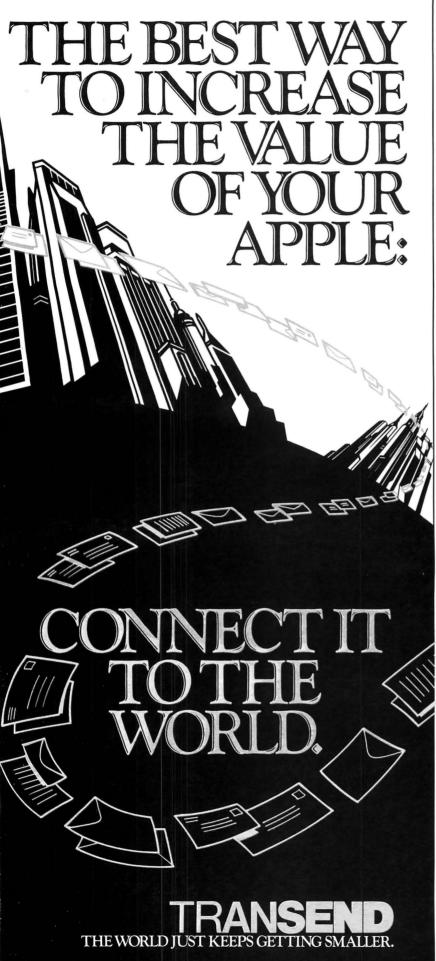
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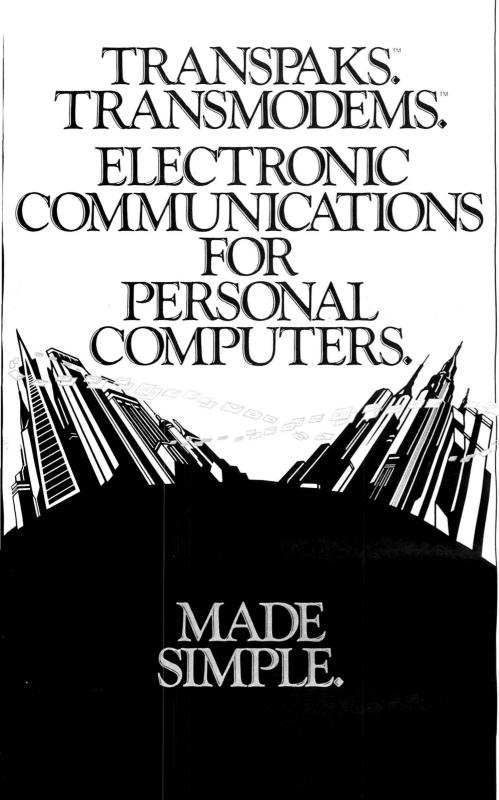
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late the others. Of course, if the user told the compiler to compile and execute, then it would abort execution if it found an error.

Assuming no errors are found, a compiler proceeds to the next step, which is figuring out addresses. It calculates addresses for all GOTO objects, subroutine jumps, and block ends and starts. An interpreter executes each syntax-error-free statement as it is encountered, resolving address questions as it goes along.

Finally, a compiler normally presents a user with the source-code listing of his program, and a listing of any errors found.

Q: What kind of printer should I get to go with my Apple IIe starter system?

A: Choosing the right printer requires a series of decisions, says Patti Dougherty of Infomax in Walnut Creek, Calif. "First of all, you have to choose between letter-quality and dot-matrix printers. This will depend on the application. Dot-matrix printers are generally cheaper, more versatile, and have better graphics capabilities than letter-quality printers. Unless they know they need letter quality, most first-time users opt for dot-matrix printers because they're so versatile. On the other hand, there's no substitute for a letter-quality printer if you need that kind of printing." Once the type of printer is chosen, there are a couple of other considerations, Dougherty points out. "Reputation and serviceability are important, especially for someone just starting out," she says. "Most word-processing software has automatic configuration options for the most popular printers, so it's easier to get up and running if you have a top-selling product. They're also easier to find ribbons and service for. Another criterion is speed, but I don't think this is as important as the

advertising would have you believe. Most new users won't be bothered by the difference between 80 and 100 cps, or 15 and 20 cps...once they see the printer operating, they decide whether or not to buy based on print quality, noise level, and appearance. The statistics don't mean that much."

Q: On a recent visit to the EPCOT Center at Walt Disney World, I saw a video display screen that did not require a keyboard to activate the computer. All you had to do was touch the screen. How does this work?

A: What you saw was an example of infrared technology. EPCOT Center uses an infrared-based computer monitor which picks up the touch of a finger on the monitor's display window. On two sides of the display frame there are LEDs (light-emitting diodes) that send infrared beams across the screen to form an invisible grid. On the other two sides of the display frame are photosensitive cells which detect the infrared beams. When your finger touches the screen, the infrared beam is broken at a specific spot on the grid. The computer recognizes this location and proceeds according to the computer's program.

Q: How can you tell a good computer store from a bad one, with so may new ones opening up all the time?

A: In many ways, shopping for a computer is like shopping for a new car. You're going to spend several hundred or thousand dollars, and you want to be able to feel good about it. The first requirement for a good computer store is service, both for you and your equipment. Regardless of your level of expertise, you should get straightforward and personal attention to your requests. Beware salespeople who can't explain things to your satisfaction...the chances are they're trying to cover up a lack of

knowledge. If you ask a question the person can't answer, he or she should admit it, and offer to find the answer for you. Nobody knows everything about computers these days.

Other things to look for in a computer store are on-site service (which means you'll get more personal attention if something goes wrong with your system), and training. If a store offers beginning and advanced training, it's a good sign that you'll get all the help you'll need. Price can be important, but again that depends on your level of experience. If you're new at computing, you'll need some help, and it's false economy to buy equipment from a source that won't help you with it later. But if you know what you want and how to make it work, then price becomes more important.

Q: Is there a convenient formula for converting kilobytes of memory to pages of typewritten text?

A: There is a handy rule, but it depends on your word processor, so it's not exact. Generally, you can equate about 3500 words with a typewritten page. Such a typewritten page is normally composed of 65-character lines, with 55 single-spaced lines to a page after accounting for top and bottom margins, according to Larry Mustachio, manager of the Commack, N.Y., Computerland.

It depends on the word processor because different processors require different control characters for formatting. These will have to be stored somewhere, and they take up space in memory and on disk. But the control characters are a small fraction of any document, so their contribution to the total character count is negligible.

Mustachio says you can use an even simpler rule to get a close approximation of the number of pages you can get into memory or onto disk. Divide the total storage area you have by 3000, and you'll be pretty

close. So if you have an 18k text buffer on a word processor, that comes out to about six single-spaced pages. Similarly, an Apple DOS 3.3 disk has about 126k of space after formatting, so it works out to about 40 single-spaced pages per disk.

Q. I read with interest your August article "American Education: The Dead End of the 80s," page 96. If the reforms suggested by the National Commission on Excellence in Education were put into effect, what would it cost? And who would shoulder the financial burden?

A. State and local governments are puzzling over these issues right now, trying to weigh the recommendations of the Commission, which included a nationwide call for a "New Basic," a half year of high school computer science, local concerns over taxes, budget crunches, teacher layoffs, etc.

While Commission chairman David Gardner noted that certain curricular changes and swaps in priorities would cost school districts nothing, the National Education Association made an estimate of what the other Commission recommendations would cost if fully implemented.

The estimate, which includes provisions for reforms such as 11-month contracts, master teacher salaries, and longer school days and school years, came to an additional $14.1 billion, if the federal government were to foot the bill. If state and local governments alone had to do it, they would need to raise state school revenues by 12 percent.

Given the current climate of fiscal austerity in Washington, substantial help isn't likely to come from there. In a radio address to the nation broadcast in April, President Reagan, who praised the Commission's recommendations, placed the responsibility for implementing them squarely on local shoulders.

"Parents," he said, "please demand these and other reforms in your local schools, and hold your local officials accountable."

President Reagan also reiterated, in his formal remarks about the report, his call for school prayer, tuition tax credits, and the abolition of the Department of Education.

(Some new forms of federal help, though, may be available soon. At this writing, a Senate subcommittee had recently reported on a $400 million version of a bill designed to provide teacher training in math and science, as well as grants for science talent in the schools.)

For expenditures in education, states currently have available to them a total of $450 million in federal funds through Chapter II, a block grant proposal which allows them to appropriate some monies to buy hardware and software. In addition, there is some federal discretionary money—less than $10 million—spent on certain technology in the classroom projects through the National Institute of Education and the "National Diffusion Network"—a federal project which identifies certain exemplary programs in schools and gives money to see those programs serve as resources and "demonstration sites" for other districts.

By and large, though, states and localities must struggle and swap on their own. According to Nobel Prize-winning chemist Dr. Glenn Seaborg, director of the Lawrence Hall of Science, University of Calif., Berkeley, and also a member of the National Commission on Excellence, "Some districts will raise taxes so (technology and higher academic standards) will be possible, while others will continue to have low taxes and an illiterate population."

"Some schools are woefully underfunded," continues Dick Ricketts, managing editor of the widely respected computing journal, *The Computing Teacher*. "The situation

is deteriorating," he says. "It's so bad in some schools they're on the point of collapse."

Yet even in times of austerity, some districts are managing to rally. In California, for example, Ricketts notes, many school districts are selling off old buildings and using the capital to buy hardware. A recent *Newsweek* report told of one Huntington Beach, Calif., superintendent, Frank Abbott, who, faced with a $12 million budget slash in the wake of Proposition 13, made a crucial decision: He fired all but three of the district's 50 guidance counselors, cut vocational programs, and, among other reforms, hired four computer technicians at half the salary of the counselors. The technicians handle curricular matters and keep the computers up and running.

In New Jersey, notes Jack De Talvo, district supervisor of instruction in the Asbury Park schools, some districts are responding to the challenge technologically, and are raising academic standards as well. His own urban district is a notable example: Its computer-aided mathematical instruction course for high school students has been recognized by the federal government as an exemplary program. That and other innovations in the school have resulted in a federal designation of "Lighthouse Technology District"—a title Asbury Park shares with four other districts around the country. In Oxford, Mass., for example, the school system is succeeding in part because it has formed a partnership with Digital Corporation in another Lighthouse school project known as C.O.F.F.E.E. (Cooperative Federation For Educational Experience), which offers an alternate occupational education program in high technology for secondary school students, many of them previous dropouts. IBM has begun a program to contribute 1500 IBM Personal Computers to 85 school districts in New York, California, and Florida

this year, and to train, free of charge, large numbers of teachers in teacher-training institutions. In a later phase of the project those teachers will go back to their high schools and train students. In March, Tandy Corporation also announced a major effort called "America's Educational Challenge," which will offer free instruction in literacy and educational computing to teachers throughout the United States. These networking and diffusion partnerships, the reasoning goes, may bring the microcomputer revolution in the classroom to the fore.

Q: Why is it important to connect a computer to a grounded electrical outlet?

A: Larry Mustachio, manager of the Commack, N.Y., Computerland, explains that the ground wire is a safety device required for approval by the Underwriters Laboratory, which approves electrical devices that are to be sold in this country. (Other countries have similar certification agencies.)

You need the ground wire because the possibility exists, although it is quite remote, that your computer's case could become "hot." If something goes wrong inside, then your computer could deliver a 110V shock.

Should such a situation occur, the grounded electrical outlet has the ability to drain the electric current away from the computer and into the ground, where it will do no damage. It will cause a huge current to flow from the 110V line into ground until the circuit-protection device—a fuse or circuit breaker—functions as it should, interrupting the current. If the circuit breaker or fuse won't stay intact after you've shut down everything but the computer, then your computer has a problem, and should be repaired.

By the way, plug all your peripherals into the same grounded circuit. If you don't, you could set up a dis-

tressing situation involving ground loops, which can cause all sorts of strange things to happen, like inducing noise that just shouldn't be there onto data lines. A common ground solves problems like this.

Q: Can you give me some guidelines for choosing the right spreadsheet program?

A: There are a couple of basic criteria for selecting a spreadsheet program, depending on your level of expertise. Lynn McLeod of the Softwaire Center in Oakland, Calif., suggests that shoppers consider how much they'll be using the program. "There seems to be a basic trade-off with spreadsheets," she says. "Either the program is menu-driven and easy to use or it's fast and efficient, but harder to use. For someone who only uses a spreadsheet occasionally, it's probably more important to have a package that's easy to use, because they're likely to forget some of the commands between sessions, and the program will help them remember. On the other hand, a person who uses a spreadsheet constantly will find all the menus clumsy to work around, and will want something faster and less friendly. It's a matter of the individual's level of expertise and the amount of time they'll be spending with the program."

Q: As a first-time user, what should I look for in telecommunications software?

A: According to Lynn McLeod, a sales consultant at the Softwaire Center in Oakland, Calif., first-time users should look for communications software that's easy to use, but not so basic they'll soon outgrow it. "With bit parity, baud rates, duplex modes, and the other protocols, communicating with computers can be a lot more complicated than other applications. A first-time user should look for a menu-driven pro-

gram with a well-written manual that will help make things simpler. A lot of programs have pre-configured options for different brands of modems, which makes them less complicated to set up. At the same time, though, the program should have disk-file maintenance utilities and some sort of text editor, so you can download and manipulate data. A new user who just buys a terminal program will soon outgrow it."

Q: What's the difference between RAM and ROM as far as the user is concerned?

A: You can think of RAM and ROM as analogous to written information. RAM is like a notepad. You can write any information you want in the note pad, and you can refer to the note pad later to recall the information. ROM is like a reference book. You can read the information in the reference book, but you can't write information in the book. (Well, you can write marginal notes, but the notes you might write aren't the material you went for in the first place. Besides, no one would deface a reference book, would they?)

You can write all the information you want into RAM, and get it back whenever you want. So that's where you store the information you're working on at any particular time. The information in ROM is put there by the computer manufacturer, and is intended for use by the CPU only. The CPU can read it, but it can't change it. It uses ROM to find out how it is supposed to do things, like display a character on the screen, or send output to a particular device. That's stuff you probably wouldn't want to fool around with anyway.

Obviously, the more RAM a computer has, the more information you can stuff into it, whether that information is programs or data. The more ROM it has, the more functions the computer will be able to perform

Lights, Camera, Computer—Action

Lee Howard is the Fellini of television commercials. At his APA Studio in New York's Greenwich Village, Howard painstakingly creates special effects such as self-wrapping Klondike ice-cream bars, self-breathing Neo-Synephrine nasal spray bottles, and Ball Park Franks which visually "plump" in three seconds.

"A good commercial is good theater," says Howard. "It has a beginning, middle, and an end, and it tells a remarkable story in only 28 seconds."

Telling that story in 28 seconds takes days, and sometimes weeks of effort. But with the help of a TRS-80 Model III, that time is used efficiently and productively to get the best work done in the least time.
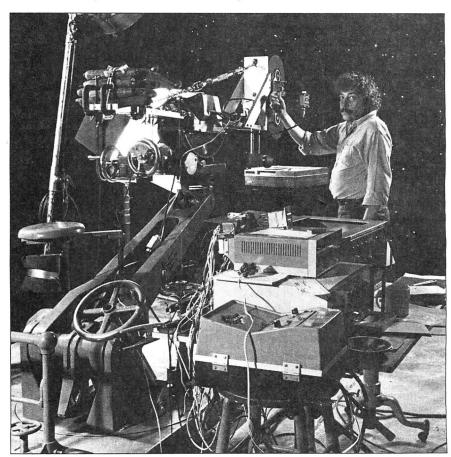
APA Studio differs from most special effects houses because they create the effect on film, whereas most studios create a prop and hand it to an ad agency with a "good luck" and a sheet of instructions. Since the effects are a blend of art and mathematics, Howard wanted to find a way to cut down on the logistics while expanding creativity.

"Fifteen years ago," says Howard, "I started building what is essentially an extremely crude computer. You've probably seen slit-scan photography, where the titles have a trail behind them, like the titles in 'Superman.' The method by which you achieve this is long time exposures while moving the artwork or camera. The computer was programmed based on synchronous timing. It worked, but it was complex to use, and it took a long time to get the job done."

"About two years ago, I decided, here I was reinventing the computer from the year one; why not just get a computer—something a bit more sophisticated. We bought a TRS-80 Model III."

Although Howard's accountant quickly commandeered the Model III for his bookkeeping and payroll work, Howard first used it for shooting motion control sequences.

"A good commercial is good theatre," says Lee Howard, who uses his TRS-80 Model III to create and control his commercials' special effects.

"In developing our motion control system," says Howard, "we needed a computer that would deal with a program that was simple enough for all of us. That turned out to be a very simple program involving a timing system. Now we have a chap here who is writing another program for us—a rather complex program inasmuch as it will do a lot, but will be simple to address. I want something that I can simply set up a move with, see it, then shoot it. This kind of program is difficult to find since our requirements are somewhat more involved than other people's. The TRS-80 has proved comparatively simple to deal with, reliable, and since we've had it, there have been no mechanical problems with it."

Howard used the TRS-80 Model III to produce a motion control sequence for a Connecticut National Bank commercial whose shooting schedule was so tight that it left no time to shoot a second sequence. The first one had to be error free. One slight miscalculation, and the entire sequence would have to have been scrapped.

"The camera was controlled electrically, and it made all the moves with the program," explains Howard. "It simply used a snorkel lens where the lens was tracking across the top of a black pool of water, moving toward the letters that said 'Connecticut National Bank.' All these moves were programmed. It was a job that would have normally taken two or three weeks; we did it in three days."

Howard also uses the TRS-80 Model III for animation sequences, and he's just bought another one so that he can have a computerized animation stand on a full-time basis. Animation is even more complex than motion control, and Howard says that using the Model III for animation sequences not only saves him countless reshoots and headaches, but has cut the cost of setting up a shot by two-thirds.

"In an animation stand," says Howard, "you have a number of axes. The camera goes up and down in a column. The artwork is on a table called a compound, which can move north, south, east and west, and rotate 360 degrees. Normally when you animate, you put down a cell, or drawing, and you move this compound one-hundredth of an inch, and shoot one frame. Then you move the camera down the column, move it to the east one hundredth, to the north one hundredth, rotate one degree, and shoot a frame. Each of these has to be written up in a log, so you've got to write down all this information, and make all the moves, to shoot one frame. There are 24 frames per second, so for one minute of animation, you have 1440 frames. And each

frame may have eight or 10 axes of motion. The calculations are enormous, and it can take you days just to get around the first test."

With his TRS-80, Howard can program the sequence and go out to lunch.

"We built an interface system that controls the motors of the camera," continues Howard, "the subject matter, the prop, the model. Eventually the lighting will be totally controlled. You can literally type in a complete program that controls the camera, opens and closes the shutter, moves the camera on the column and moves the compound north, south, east, or west. It rotates, it shoots the frame, and it does it all automatically; and when it's finished, it stops. With the TRS-80, you can do it and the next day, look at it. In a day or two you can have what normally would take a week or two. Also, now you can concentrate on doing more interesting moves, more interesting artwork, because you don't have to be bothered playing machine. The computer takes all the machine action, all the boring repetition out of it. So, you can concentrate on aesthetics; the motion, the color, the design. It gives you a great deal more freedom."

Howard is also considering using the Model III to keep track of his inventory, not only props and equipment, but the special formulas he sometimes has to concoct to make an effect work. While preparing the "breathing bottle" for Neo-Synephrine, Howard had to create a special ink that wouldn't peel or crack when it was printed on the expanding latex model. The formula for the ink is kept in a notebook. Somewhere.

"We've kept all these formulas in notebooks," says Howard, "and it's a matter of finding out who has the right notebook and where it is. Now we're considering putting our whole formula log on disk so that anyone can just pick it up and trace out a

particular method without going through files and books and little bits of paper."

Though he has been successful at writing his own programs, Howard would still like to find software that he can use to further expand the Model III's capabilities in creating special effects.

"We have yet to find any software that we find applicable," laments Howard. "There is a whole area of CP/M programs that I would like to investigate, and that's why we are considering buying a TRS-80 Model 4, because of its CP/M capability. From what I understand, there are a lot of CP/M programs that may be applicable to what we're doing."
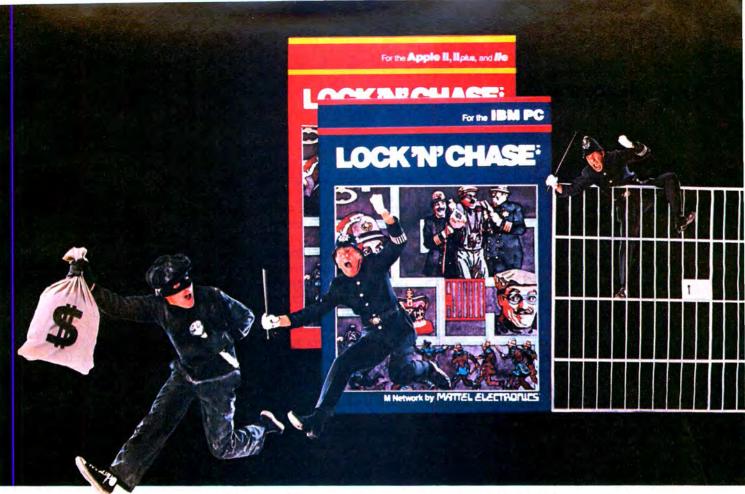—Susan Jelcich

A Study For Home Computer Users

What's male, 36 years old, and earns $38,000 a year? The answer, according to a recent Stanford University study, is the average home user of a personal computer.

"The Diffusion of Home Computers—An Exploratory Study" was published by Stanford Institute for Communication Research, and, according to its authors, was designed to discover the role that communication networks play in a person's decision to purchase a personal computer.

Stanford professor Everett Rogers, doctoral candidate Hugh Daley, and now-graduated Thomas Wu wrote the 170-page report earlier this year, documenting how people are influenced to buy a computer. They discovered, among other things, that the purchase of a personal computer is very different from the purchase of most other "innovations."

"Usually," explains Wu, "innovations become known to the public through the mass media. But in our study most computer owners have become aware of them through

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CIRCLE 10

interpersonal channels." For 55 percent of those studied, talking to others was the most important source. Another 40 percent listed mass media as their most important source of information.

To gather the data for this study, members of Stanford's "The Diffusion of Innovations" class interviewed computer owners and potential computer owners in the winter of 1981-82. About 90 people were interviewed, 77 of whom already had a personal computer in their homes; the rest were considering a purchase.

When the information was finally in, the researchers found many surprising answers. Among them was the discovery that home computers reduce the user's television viewing by more than half an hour per day. In fact, 40 percent of those questioned reported an average decrease in time spent watching TV of 1.5 hours per day.

The average computer owner could legitimately be called something of an addict, spending 17 hours per week using it. The study showed a wide individual range, however: Some people reported usage in excess of 50 hours per week, while others said they don't use their computers at all.

As for where they kept their computers, 26 percent of those questioned found a home for theirs in the bedroom; 25 percent in the study; and 16 percent kept their computers in the living room, where everyone can see them.

In general, personal computers were found to be used by the principal purchaser as well as family members—including spouses, older children, and children under 12.

Seventy-one percent of the respondents reported time-savings with their personal computers. Word processing was named most frequently in this category, followed by problem solving, then invoice managing.

Thirty-five percent reported that using their personal computers saved them money, both by using it to aid in budget planning, and as an alternate form of entertainment (65 out of 77 personal-computer owners reported using them for entertainment). While not seen by respondents to be the major reason for taking the purchase plunge (that distinction went to work and business-related benefits), entertainment is the application on which users said they spend the most time. They spend an average of five hours a week playing the games, and about 2 ½ hours a week doing word processing.

The study reports that most computer owners were very satisfied with their purchase. When asked to rate their satisfaction on a scale of one to seven, two-thirds of the respondents gave the top two scores. But life is not entirely a rose-strewn path for the computer owners; they had some bones to pick, in addition to their praise. Sixty percent reported that they have experienced problems with their personal computers. Most people cited poor documentation, but problems with hardware, lack of useable programs, and difficulty in learning to use programs were noted as well.

Major deterrents from purchasing a personal computer, according to those studied, were cost and anticipated difficulties in learning to use one. Perhaps in response to such anticipated problems, 70 percent of those interviewed reported they subscribe to computer magazines, and one-third said they had joined a computer users club.

Interaction with other computing fans was common. The average computer owner knew five others who owned one before he, himself, made a purchase. Once these people became owners, they reported having talked to an average of 13 people in the previous month about their personal computers. And, they had given demonstrations of their equipment, they said, to about five others.

Those users who had computer ex-

perience before making their purchase were less likely to talk to people about—and demonstrate—their computers, but surprisingly, they were more likely to persuade others to make a purchase. This indicates that perhaps such users' familiarity with the computer and its different functions allows them to be more effective persuaders than others.

The three authors of the study suggest that personal computing is spreading rapidly now, as more and more people are purchasing their own computers and sharing their enthusiasm with others. Joining the interpersonal influences on computer buying are the growing influences of the mass media and government policy. The increase in computer classes at public schools, for example, makes more people aware of computing, causing more to buy computers.
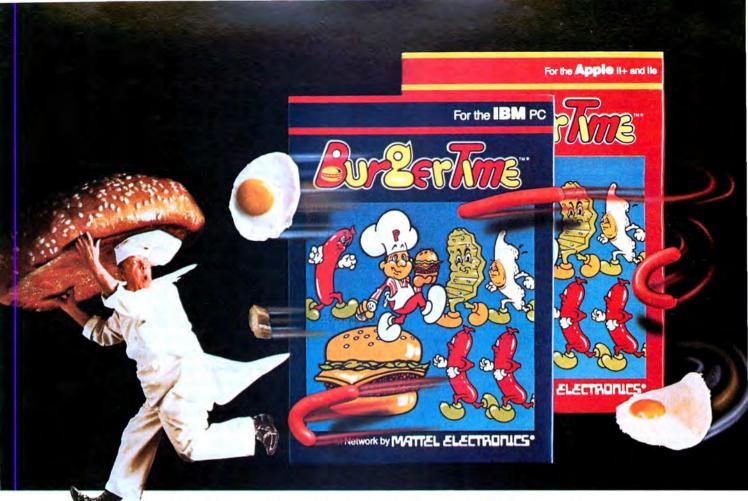
But this study is not meant to be the last word on computers and their purchase. Rather, it is simply a starting point; an exploratory study the authors hope will foster more research in some of the areas it touches.

"It tells us a little more about home computers and where they're going," says Wu. "It also gives us a better look at the types of people who are purchasing them now."

Taking The Show On The Road

How do you teach kids about computers when you don't know anything about them yourself? That's a problem many educators are facing today. This classroom knowledge gap is exactly what "Computers: Expressway to Tomorrow" was designed to help fill.

A traveling multimedia show sponsored by Atari, Inc., "Computers: Expressway to Tomorrow" is a 40-minute program which introduces the basics of computers to high school and junior high school students and their teachers. Using film and music

Introducing BurgerTime™*
for your Apple and IBM. To beat this game,
you've really got to move your buns.

Now you can make your Apple® II and IBM® Personal Computer sizzle. With fast-food action from BurgerTime™* by Mattel Electronics.

Build a better burger. Hold the mustard. And watch out for those pickles!

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as a backdrop, and a professional actor or actress as host, the show takes bits, bytes, RAM, and ROM, and crunches them down into a presentation that is easily digestible by both students and teachers.

"The show is about what's happening in the world because of computers," says Rick Trow, president of Rick Trow Productions, the company that prepared the show. "It invites the students to join the revolution by getting involved with personal computing."

Since January 1983, nine separate touring units have crisscrossed the United States, presenting the show to nearly 1400 public and private schools—a total of 1.2 million students to date. Touring begins again this September after the summer break, and will run through December 1984. By then, it is expected that more than 4000 schools will have been visited, and approximately 3.8 million teenagers will have seen the program.

Ginger Davis, an actress who has toured as a hostess with the show since its start, says, "I've always felt I was giving people something really special with this program. I'm exposing a lot of people to something they wouldn't have explored otherwise."

The show, she adds, is "pretty straightforward. Although it involves performing, it isn't a singing, dancing, glitzy thing; that would have missed the point. It's really down-to-earth. (The producers) wanted to allay any fears people have about the computer field, to show normal people using computers."

The show is a lively one, with the host on stage for the entire presentation. Several film projectors are going at once, filling two huge screens with fast-moving shots. Music is constant throughout. The host is busy either talking to the audience or interacting with characters on screen. "My energy has to be way up there," Davis acknowledges.

Davis has also learned a lot through doing the show, she says. Explaining software and hardware, modems, and memory to her audience has "piqued" her interest in computers. "I can see myself being more comfortable with the thing," she comments.

That's just what the program aims to do—give people that feeling of comfort about computing. The show focuses on the many applications of computers today, from storing recipes to teaching a language, to tutoring. Real-life careers that tie in with computers are also part of the show. The film shows how computers are used in medicine, art, music, and sports.

"Our project," says Trow, "puts people at ease about computers. It demystifies the computer. It puts it in its place, which is as a tool."

Students had a lot of fears before seeing the show, Trow says. They saw computers as cold and difficult to use, and were afraid that the machines would take jobs away from people. "The show was aimed at debunking all those fears," Trow says.

Davis agrees. "There's a lot of reassurance in the program," she says. She adds that for people who are afraid that "computers are taking over the world," the program helps them see that "There's room for people in the computer field, too."

Post-performance feedback has in fact shown a marked improvement in the students' outlook toward computers. Fifty-seven percent said they figured they were more likely to use a computer than they had thought before; 22 percent said they were now anxious to use one.

"I get a huge response after every show from a lot of people who would not even have considered computers before," Davis says. "Everybody really has had positive responses. The adults have been especially astonished. They come up and say, 'I can't tell you how much I learned from that.'"

Calling the show a "phenomenon," Trow says, "the response has been so great from the schools, we can't even get to them all." "Computers are the hottest thing in education today," he adds. "Most educators know that, and they're real anxious to keep up with computing."

But first, they need to be informed, to find out for themselves what computers can do. And that hasn't been an easy transition for traditional educators to make. "The problem," says Trow, "is we have this powerful new thing and we don't quite know how to use it yet in education .... But every day we're getting closer to knowing how."

The New House Of The Future

Ten or 15 years ago, buying a house equipped with a dishwasher was considered a luxury. Now, most buyers expect to see a dishwasher *and* a garbage disposal. This same evolution will take place with the purchase of "computer ready" homes— at least that's the hope of the Southampton Company, builders of these innovative new homes.

Each of Southampton's homes has two telephone lines (one attaches to a modem) and extra electrical outlets. They are perhaps the first in the country designed to suit the needs of home computer users. "We don't know of anyone else anywhere who's doing it," says Rod Herman, the public relations director for the company.

To make the homes even more impressive, they come with financing options any personal-computer user, or potential user, will love: $3500 worth of computer equipment that can be financed along with the mortgage, allowing buyers to spread their payments out over 30 or 40 years.

Construction of the 20 computer-ready homes began last May in Be-

It took hundreds of years to build the world's most advanced spreadsheet.

Way back in 1534, a Venetian scholar wrote a text that standardized the techniques of modern bookkeeping. And up till 1979, there weren't a lot of real improvements in the way people did spreadsheets. You still had to enter all your figures by hand. Run all the totals yourself. And when you had to make a few changes, you had to run the totals all over again.

Then along came a program that let you create spreadsheets on a personal computer. Without touching a pencil. Or adding anything by hand. Best of all, this new program gave you the freedom to look at your balance sheet a dozen different ways if you felt like it. Because all you had to do was change one figure, and the computer would refigure everything else for you. Automatically.

Like most breakthrough ideas though, this original spreadsheet program had a few things that definitely needed improvement. For instance, all the columns had to be the same width. And the entire system took about 20 hours to learn.

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Today, we've gone even farther. After talking with thousands of customers, we've found a lot of important new features you'd like to have. And we've built them into the world's most advanced spreadsheet.

SuperCalc².

1981

1979

1534

STATEMENT

	JAN	FEB	MAR
SALES	1000	1100	121
COST	300	330	363
GROSS	700	770	847
R & D	160	176	194
MARKETING	200	224	251
ADMIN.	140	151	163
TOTAL	500	551	608
INCOME	200	219	239
TAXES	80	88	96
NET	120	131	143

INCOME STATEMENT

NET SALES

COST OF GOODS SOLD

GROSS PROFIT

RESEARCH & DEVELOPMENT
MARKETING
ADMINISTRATIVE

TOTAL OPERATING EXPENSES

INCOME BEFORE TAXES

INCOME TAXES

NET INCOME

(continued from page 34)

nicia, Calif., 32 miles from San Francisco. The project grew, in large part, from Southampton's success in building and selling solar homes. "By the public's response, they were telling us they were ready to incorporate non-traditional things in the home," Herman says. "The obvious next step was computers."

"We've seen the explosion of computers in the last few years," he says.

Southampton representatives began talking with people in the computer industry to get their advice on how to make homes computer-ready. From that information came the decision to add the extra phone line and outlets in two rooms in each home: the family room, where family members are most likely to use the computer for entertainment or educational purposes, and the smallest bedroom, which might be used as a study or office. Herman says that from now on, all the homes Southampton builds will be computer ready.

Victor Freeman, a partner in the Southampton Company, says, "Basically, by prewiring our homes for this need, we're anticipating what very likely will become a necessity in the home in the not-too-distant future. We're providing the home buyer with a home that won't be obsolete five years from now."

"And, for the person who works behind a computer five days a week, with our dual phone lines, he can easily and efficiently access his office computer and save time, money, and energy by working out of his home," Freeman says.

It is precisely with work in mind that the computer features in the spare bedroom were designed. The phone line and electrical outlets are located inside the closet, which has a built-in overhead light to illuminate the area, and closet doors which can be removed to form a little computer alcove.

"It's time that the building indus-try recognized that a house has to function as more than just a place to live. It has to function as a work place, too," Herman says.

But what about people who aren't interested in computing from their homes? Could these additional features deter them from purchasing one of these homes?

Not according to Herman. "We purposely didn't want to make the homes so they'd scare away families where someone is intimidated by computers." The extra phone line in the bedroom could be used as a child's personal number, he says, and the closet could be a regular closet.

"Even if the people who buy our homes aren't computer enthusiasts," Freeman says, "they still have a home that internally is ready for tomorrow.

"If a person ever decides to sell his home," he adds, "the resale value of that home will be greatly enhanced by the computer-ready features; especially if the person he is selling it to is a computer enthusiast."

The people at the Southampton Company seem confident that their way of building homes is the way of the future. According to Herman, there are going to be some changes made. "It's time the housing industry recognizes that computers are going to be a part of the average consumer's life," he says. "We think what we're doing now will be standard five years from now. A builder won't be able to sell a home without these features."

Computer "Reads" For Blind Professionals

Twenty-nine-year-old Mike May sits at his computer, poring over the current information on Nigeria's political system. As a foreign affairs analyst, May is keenly interested in reading about today's political climate; as a blind person, he is interested in simply being able to read.

Reading is not something the blind take for granted. And with a device called VersaBraille, that task is becoming a lot easier for blind people

VersaBraille allows May to read computerized text using his fingers instead of his eyes. The 10-pound, portable personal computer contains a standard braille keyboard made up of six keys which write braille characters, and a long row of electro-mechanical pins which are configured into 20 braille "cells," or letters.

Manufactured by Telesensory Systems Inc. of Mountain View, Calif., VersaBraille allows the blind person to compute in his own language, easily translating written information back and forth between braille and printed text. It can interact via cable with virtually any computers which have RS-232-C ports, giving both the blind and the sighted the ability to write in their appropriate languages, yet still understand one another.

The self-contained system has two memories of 1k each in addition to its cassette tape storage. The unit, which is about the size of a briefcase, looks more like a children's tape recorder than a sophisticated $6450 piece of equipment. But in return for the large price tag, the user is given computer editing features such as insert, delete, etc., which constitute a breakthrough in computing power for the blind.

"A sighted person in a library could take a week to do what I do with VersaBraille in five minutes," says May.

According to Greg Fowler, who has been blind since birth, Versa-Braille is simple to learn. "All you need to know is how to operate the machine, and braille." Fowler, a systems programmer at Hewlett-Packard in Palo Alto, Calif., often brings his VersaBraille back and forth from work.

"I've taken it to lectures and meetings, and used it to take notes," he says. "The nice thing is you can take it anywhere, because it's battery operated. It also uses standard *(continued on page 190)*

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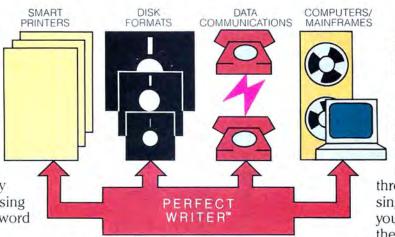
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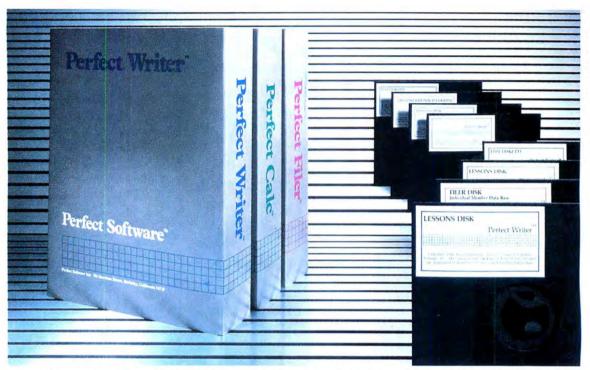
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Apple's Floyd Kvamme On Computers, Corporations, And The Future

The summer of 1983 proved very eventful for Apple Computer, Inc., the California company that played a large role in making personal computing possible. In April, Apple joined the elevated company of the Fortune 500 corporations. At the beginning of the summer, shipments of the much talked-about Lisa computer began. And by early July, the one-millionth Apple II rolled off an assembly line in Texas. Looking at the point Apple has reached in its short history, it seemed appropriate to check in and see how the company views the past, present, and future.

Providing that perspective was E. Floyd Kvamme (pronounced Kwammy, rhyming with swami), Apple's executive vice president of marketing and sales. While Kvamme has only been at Apple since January of this year, his background gives him a broad viewpoint on the personal-computer marketplace. With two de-grees in electrical engineering, Kvamme is a Silicon Valley stalwart, having spent some 16 years at National Semiconductor.

Kvamme, 45, is a youthful and energetic man with a great deal of enthusiasm for the prospects of personal computing. While his marketing background is apparent, he also has a philosophical bent, a penchant for the apt analogy, and an already clear affection for his new company.

What were your initial impressions of Apple?
Kvamme: I started out in semi-
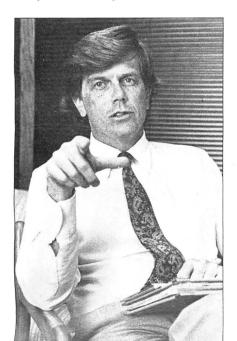
> *Computers will be approachable. It won't be necessary for people to become computer-like.*
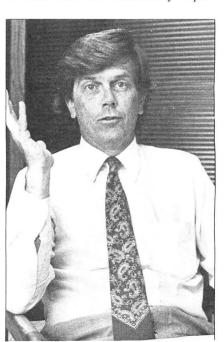
conductors in the 1960s, and there's a lot of the semiconductor 1960s in the Apple 1980s. In a very real sense, I think that personal computing can have the kind of impact in this decade that semiconductors had in the 1960s. There are a lot of very bright people with lots of good ideas working here—people with lots of different visions. And the company is young—a lot younger than I am.

Apple's revenues are a billion dollars. We're proud of that, because that's a very high revenue rate for a company in this industry to have with only 4000 employees. Where I came from, we had over 30,000 employees, and the same revenue rate. That many people means a different management structure—you have more individuals doing more things.

Apple has less of that. Frankly, I think it's because of the productivity that's been provided by the equipment. We use it as a sales pitch, but it's also true: The availability of per-

sonal computing for each employee has enabled us to keep working units relatively small.

How are decisions made about what products to introduce and how to position them?

Kvamme: Product positioning depends on a number of things. When you take a product to market, you make the positioning statement the day you introduce it. Theoretically, you have 100 percent control of the positioning at that point, particularly if the product is not anticipated by the market. You have control over what you want the product to do or be. After that, market forces start to affect the product.

We're tool builders, and what people end up doing with those tools isn't always obvious. I don't think anyone could have predicted there would be 5000 different uses for the Apple II. Market forces start to take effect, and you enhance certain of those forces and not others. If you introduce a product aimed at journalists and something better comes out, but then farmers really pick it up, you might enhance it for farmers and do something different for journalists.

The important thing is to take market forces and time into account. You have to ask: What is the marketplace trying to do with this product?

Then support that application.

What do you think personal computers will be like five years from now?

Kvamme: I'm committed to the idea of personal computers as tools. They'll be used as tools in lots of different areas—organizing, analyzing, verbalizing, planning

The closest analogy is the telephone. People started to use telephones for long-distance conversations. Messengers and runners were still around and certainly, at the outset, no one ever conceived of using an electronic device on their desk to call someone at a desk 50 feet away. But suddenly that became a better way. In that sense, a phone is a tool.

What you do with a phone in the home is very different, but the approach is very similar—you pick it up, and punch the numbers in; that's the action. But the content of what goes on in your home conversation could be called entertainment or per-
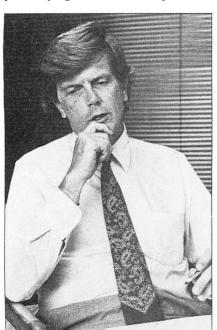
We're tool-builders, and what people end up doing with these tools isn't always obvious.

sonal communications. In other words, five years from now, you'll have an appliance that will have very similar characteristics between home and office and school; but like the phone, the way in which you use those will differ.
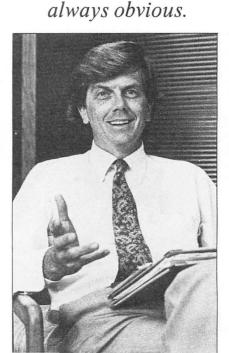
I see another change coming, relative to obviousness of use. I like to ask out-of-town visitors who come from the airport with a rented car: When you got into the car, did you read the manual before you left the parking lot? The answer, of course, is universally no. I think in a very real sense, the same will happen with computers. The use of these things will be very intuitive.

I don't think it's obvious what computers will be used for, but they will be tools with similar interfaces used across a spectrum of applications. Approaching the application will be similar, but the applications will be different. And they will be very approachable—it will not be necessary for people to become more computer-like—computers will become more people-like.

Is there a conflict between the performance of computers and so-called user friendliness?

Kvamme: There are two kinds of technology products. Take semiconductors: There were performance

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semiconductors and function semiconductors. The former sold because they did something a nanosecond faster, or something like that. The latter sold because they were keyboard interface chips, they were clock chips, or whatever. Function versus performance.

The 1980s are the era of function *through* performance. Namely, it takes a very sophisticated piece of silicon to do great speech; it takes 32-bit architecture to really move things across the screen, so you get super graphics and very fast response. You're looking for the right function, and you use performance to get there.

What aspect of personal computing would you want to see preserved in the corporate environment?
Kvamme: Personal productivity. That's the key. There are so many situations where you find yourself fumbling through a file looking for something, trying to put something together. For example: I use my Lisa at home as my speech file. I give a lot of speeches, but I never like to give the same speech twice. I prefer to tailor my remarks to the audience. That's a lot of work, but with the aid of the word processor and the list capability, I can browse through the previous speeches.

So, personal productivity is the essence—whether it's analysis, drawing, preserving words—whatever you're trying to do. When you look at personal productivity, though, you see an interesting thing. Studies tell us that 80 percent of the numbers that are looked at by people in a corporate environment have been in an electronic form someplace else. It makes more sense to get them directly.

I'm not of the school that believes everyone will get their own computer and central computers will disappear. I couldn't be further from that camp. People will have a processor of their own, they'll want to communicate with people in other work areas who have processors, and occasionally they'll want to go up to some large mainframe that has data on it. That's why we're doing things like work-area networks, and supporting Ethernet and Cullinet.

When large corporations put personal computing in place, en masse, is there a danger that some of that productivity ability will be lost?
Kvamme: I don't think so—as long as the use of the machine is intuitive enough. Again, let me go back to my telephone analogy, because this is an interesting aspect. The telecom group in the large corporation goes out and spends lots of money to put a PBX in. The PBX has 16 functions, and you get this phone on your desk and someone shows up and tells you that

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I read all this stuff on computer literacy, and I really wonder what we're doing.

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if you want to do this, that, and the other thing—call-forward, conference,—you push this and that.

The company paid good money for those things, and you remember about three of them. Why don't you remember the other 12? It's because you don't use them every day, and they weren't intuitive enough. You had to read the manual before you drove out of the parking lot. That ain't going to work, is my point of view. It will have to be intuitive enough that the person can say, "Aha, this is something I can use."

We had a user on the Lisa—he'd had it for about six weeks—and as one of our first big customers, he was very excited. His response was that this was absolutely amazing, and he said something that I hadn't thought of before. He said that this was the first machine that had been put on his desk since he started his work life—this guy is in his 50s—that he didn't have to relearn after a one-week business trip.

It's a funny thing. There's almost a cult growing now, of people who are proud to say that they've had their Lisa for "n" amount of time, and they haven't opened the manuals yet.
The whole drive for user-friendliness raises the question of what kind of education should we be giving kids?
Kvamme: A very, very interesting subject. I read all this stuff on computer literacy, and I really wonder what we're doing. People buy low-end machines and think, this is how I'm going to learn if a personal computer is right or not. To my mind, that's like buying a Link trainer to learn how to fly, only to find out after you've learned how it works that the thing won't take off.
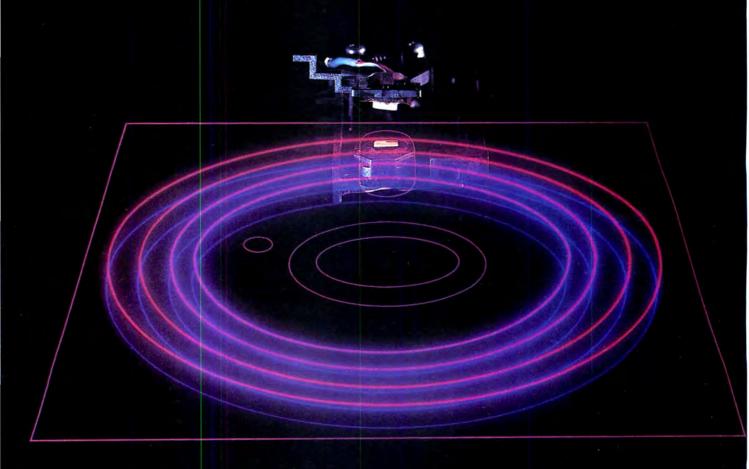
Computer literacy isn't the issue; the issue is, what am I going to do with it? To what end am I becoming literate? Now, I have nothing against knowledge for knowledge's sake, but when you start telling people that it's going to be necessary to know these things even to be employable in the 21st century, I think you're misleading them.

In the same breath, I have to say that a lot of driver education in schools is good. There are dangers out on the road, and you want to make people aware of what these things are capable of, but you don't want driver education that focuses on how the engine works. A lot of computer literacy now focuses on how the engine works, and only 1 percent of the population is going to need to know that.
Apple now has several different operating systems. How important is compatibility?
Kvamme: We think about it a lot. What we're doing with the II/III line, for example, is to allow a diskette to go in any member of that
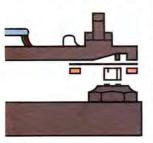
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by Betsy Gilbert

Fresh out of the crate, your brand-new computer sits on a desk or table, beckoning you to enter the world of personal computing. The computer's been hooked up properly and all systems are go, it seems. Well, almost all. You may soon experience

Betsy Gilbert is a California writer who frequently covers the computer industry.

an uncomfortable feeling that all is not perfectly right. You may actually be . . . uncomfortable.

The problem isn't *you*—it's the furniture your computer is placed on. Like the majority of first-time computer users, you probably acquired your system without giving much thought to how it would fit into your home or office. You naturally assumed that if a standard table or desk could comfortably accommodate a typewriter, it would serve a computer just as well.
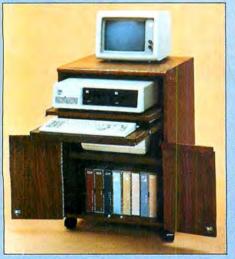
That, unfortunately, is not the case. Computers don't adapt well to standard furniture. They have their

own housing requirements, which not even the finest, sturdiest piece of traditional furniture is equipped to handle. To operate at peak efficiency, a computer needs furniture designed to handle special requirements: things like holes for power cords, trays for keyboards, shelves for disk drives and printers, drawers designed to store printouts, hangers for CPUs.

You get the picture: these are exactly the kinds of features standard home or office furniture can't offer. But where do you go to find the furniture that *is* right, and once you find it, how much is it going to cost?
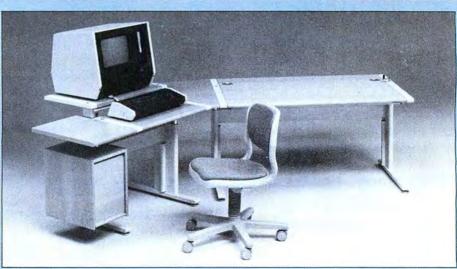
It's impossible, of course, to answer

IAIR • DESK • DISKFILE • CABINI

APER TRAY • SOFTWARE HOLDER • PRINTER STAND • DISK

ABOVE: Versatec Corp.'s Compucart offers a mobile computer that can carry your IBM Personal Computer and software anywhere in the office or home. **RIGHT:** The DataBoard terminal workstation from Krueger gives you all the work area you need.

*Computers simply
don't adapt well
to standard furniture.*

those questions in detail—the computer furniture field has simply grown at too explosive a pace. But what follows is a guide to the broad boundaries of the territory, and a few suggestions from representative manufacturers and dealers. Armed with this overview, and the accompanying buyer's guide, you should be able to find some satisfactory answers for yourself.

Prices range widely
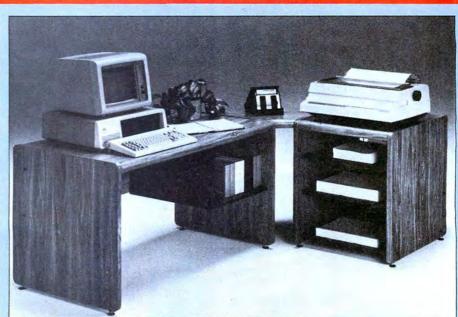
You usually don't have to go any farther than your telephone book to shop for specialized computer furniture. There are dozens of manufacturers offering their wares directly, through distributors, through computer retail stores, in traditional furniture stores, and in office supply centers. Depending on what you need, there is generally a place to buy it within driving distance. If you live in a small town which doesn't yet have a supplier, you can flip through advertisements in computer and business publications, get the names of several companies, and order your furniture through their catalogs.

When it comes to cost, the kind of furniture you want will determine what you spend. Prices range from

AND • ADJUSTABLE TABLE • C

MPUTER • TABLE • STACKER • STATION • SHELF • CHAIR

ABOVE TOP: O'Sullivan Industries's computer work center table centralizes your personal computer activities into one area. There's room for software, hardware, and you.
ABOVE: A wide variety of computer furniture is available from the Electronic Systems Furniture Company. Its sleek design allows you to move your computer and printer toward you and then out of the way when not in use.
LEFT: Frontline Products brings a functional design to computer furniture.

• DISKFILE • CABINET • COMPUTER • TABLE • STACKER • S
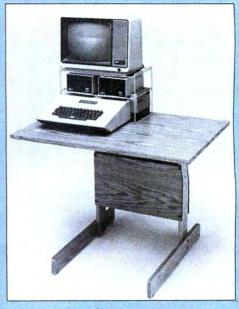
under $50 for a particle board computer table to upwards of $1500 for handcrafted red oak desks. If you take your time and shop around, you will likely find exactly what you need for your home or office, at a price that won't be damaging to your budget.

As you're making your pre-purchase evaluations, there are a couple of important criteria to keep in mind. The first is ergonomics, an odd-sounding word that in layman's terms simply refers to user comfort. Er-

AY • SOFTWARE HOLDER • PRIN

LEFT: The DataMATE Model 10500 security workstation gives you a comfortable work area with the ability to lock your computer at night.
ABOVE: The Alpha/Computer Mate table with the Apple Stacker from Universal Industries offers a convenient place to operate your personal computer whether you're at home or in the office.
RIGHT: A contemporary design, Krueger's new COM continuous workstation with task lighting is an ideal candidate for the office which requires dual workstations close to each other.

*Is the furniture
designed with flexibility
to expand and change?*

gonomic details are major design factors with computers, and they are equally important in computer furniture. Is that table or desk you're considering the correct height to accommodate your computer and ensure that you won't suffer eye or muscle strain while you use the system? Does it feature rounded edges to prevent you from cutting off the circulation in your arms when you sit at the computer for long periods of time? These are small details, but they can make the difference be-

tween a useful piece of furniture and one that is more hindrance than help. Ask the salesperson you're dealing with to point out ergonomic features, and make your decision on what feels the best.

The second critical area is modularity. Does the piece of furniture you're evaluating have the flexibility to expand and change with your particular computing needs? Will it accommodate additional disk drives or a larger printer? Can it handle the change from an all-in-one system to

one that features a detached keyboard? If it's a table, does it have wheels, so that you can easily move it to different locations? The greater the flexibility, the better the bargain.

Setting priorities

Once you've determined what you need in computer furniture, and you've figured out how much you can afford to spend, you're ready to start shopping. If your priorities are basic functionality and low cost, your best bet is an office supply center. It will generally offer a wide choice of products with a range of prices to match, and salespeople who are experienced in dealing with the first-time computer furniture buyer.
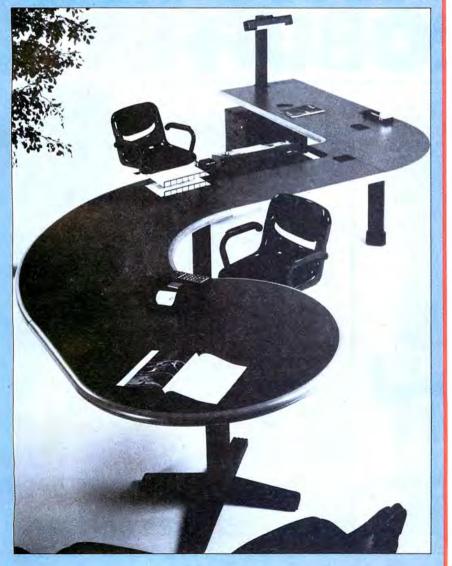
"Everyone who has a computer needs computer furniture, but no one knows exactly what it is they should have," says Barbara Wisner, furniture merchandise manager of Northern California's Peninsula Office Supply. "Most of our customers buy a computer one day, then come in here the day after when they realize that their present furniture just won't accommodate the new machine."

Wisner adds that the store, which has seven offices in the San Francisco Bay area and offers desks, tables, and chairs from more than a dozen computer furniture manufacturers, does the majority of its computer accessory business in the $200 and under range. The firm has offered computer furniture for almost two years, and Wisner says that the lower-priced pieces are selling faster than any other stock items.

"About half of our customers are people working with their computer at home, and the other half are involved in small office situations," Wisner explains. "They have a limited amount of money to spend, and they want a desk or table that's compatible with their existing furniture."

Wisner points out that, because personal-computer systems are configured differently from manufacturer to manufacturer, furniture

STAND • DISK STAND • ADJUSTABLE TABLE • PAPER

If you guessed that a Practical Peripherals Micro-buffer™ printer buffer saves time, you're right. For the way it works, this inexpensive product is the most practical addition to your microcomputer system ever.

With Microbuffer, you don't have to wait for your printer to finish before you resume using your computer. Data is received and stored at fast speeds, then released from Microbuffer's memory to your printer. This is called buffering. The more you print, the more productive it makes your workflow.

Depending on the version of Microbuffer, these buffering capacities range from a useful 8K of random access memory — big enough for 8,000 characters of storage — up to a very large 256K— enough for 256,000 characters of storage.

Practical Peripherals makes stand-alone Microbuffers for any computer and printer combi-nation, including add-on units especially for Apple II computer and/or Epson printers. Each has differ-ent features like graphics dumps and text format-ting besides its buffering capabilities. You can choose one that's just right for your system.
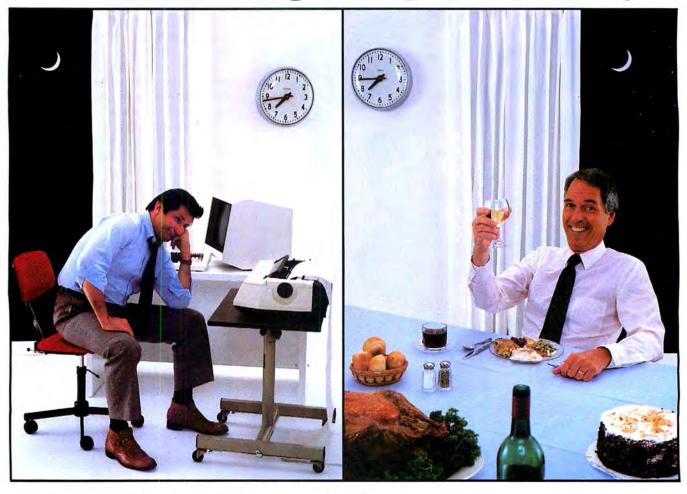
Best of all, they're built to last and work exactly like they're supposed to.

If you're still guessing whether you can afford to have one, talk with any computer dealer. That's the best way to find out how practical a Practical Peripherals Microbuffer is.

PRACTICAL PERIPHERALS

31245 La Baya Drive
Westlake Village, CA 91362
(213) 991-8200

GUESS WHO HAS MICROBUFFER.™

shopping is a lot more complicated than simply choosing pieces according to price.

In pre-computer days, everybody had to have a 30 by 60 desk, with added space for return built in if the desk was also used for typing, she recalls. "Today, everybody needs something different. Some computers have a CPU/monitor split, some have detached keyboards, some come in a console design, so what customers need in terms of equipment and space varies. Our stores, and now many of our competitors, offer furniture that can handle all these special requirements," she says.

Furniture by mail?

A second source for low-cost furniture is provided by manufacturers who sell directly to the public. While this group generally sells in bulk quantities, either to large offices or other retail establishments, most of them are more than willing to sell to individuals.

Cargo Furniture and Accents in Fort Worth, Texas, goes directly to the public through its print media ad campaign, offering quality, stylish hardwood designs for prices one typically associates with less substantial products. The firm's computer stand retails for $78, and its printer table goes for $85—good prices in anyone's book.
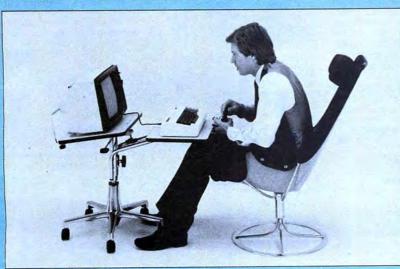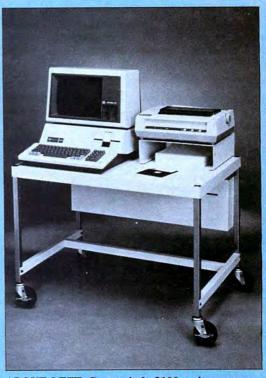
"We're one of the lowest-priced computer furniture lines currently on the market, but we don't believe low

• DESK • DISKFILE • CABINET • COMPUTER • TABLE • STACKER • STATION • SHELF • PAPE

ABOVE LEFT: Samsonite's 3100 series offers a modular design work area which provides exceptional adaptability.
ABOVE: Bretford Manufacturing offers a mobile personal-computer stand which is designed for an easy work flow. The paper compartment located below the printer makes it easy to change the paper.
LEFT: NKR's mobile terminal table is great for the home personal computer. Through its unique design, you're able to adjust the height and angle of the keyboard, display, and table independently.

A BUYER'S GUIDE TO COMPUTER FURNITURE

The price or price range listed for each company's product is for a configuration suitable for a personal computer, monitor, printer, and disk drives. In many instances this price includes more than one furniture unit. The company listings are divided into three categories: those that produce furniture for the home, office, or both. This is done as a convenience for the reader; many buyers prefer office-type furniture for their homes, and vice versa.

HOME

CARGO FURNITURE & ACCENTS
P.O. Box 2934
Fort Worth, TX 76113
(817) 284-5235; (800) 433-4018
$188
Solid pine computer table with removable top shelf to accommodate both detached and single-unit computer models. Includes rolling printer cart.
CIRCLE 300

CBO COMPANY
100 Lane Pine Road
#2 Aspen, CO 81611
(303) 925-4921
$1495
The Computer Box Office is Oak furniture with walnut trim. This ergonomically designed, completely enclosed workstation houses all components. It takes up only 4 square feet, when shut. Two 2-foot tables fold down to add additional work areas.
CIRCLE 379

(CONSUMER FURNITURE CO.)
COMPU-CABINET
4920 Starr St.
Grand Rapids, MI 49506
(616) 452-0688; 1-(800) 543-0011
$995
Looks like an armoire when closed. Inside are adjustable shelves and work surfaces to fit any computer system. Furniture is constructed of solid maple or oak veneer with steel fittings; insides of doors have shelves for printer and other uses.
CIRCLE 301

CRANFORD COMPUTER FURNITURE
2220 Mountain Blvd.
Oakland, CA 94611
(415) 531-2714
$125-$145 (includes UPS)
Laminated finish over 3/4-inch chip core; edges are vinyl-banded. Storage shelf underneath for documentation; paper feed for printer at back of table. Easy to assemble with just a screwdriver.
CIRCLE 302

J.K. PRODUCTS INC.
3020 Bridgeway Suite 351
Sausalito, CA 94965
(415) 332-8262
$995-$1995
Solid oak, Danish modern style furniture of a modular design. Drawers and storage cabinets can be added. Printer table is free standing.
CIRCLE 303

MONTOUR WOOD PRODUCTS
P.O. Box 703
Bloomsburg, PA 17015
(717) 387-1583
$340
Early American style furniture comes in choice of two finishes. Computer workstation and printer stand with cabinets are sold separately, but fit together to form a total work station.
CIRCLE 304

PRESENTATION SYSTEMS INC.
455 Powell St.
San Francisco, CA 94102
(415) 956-6399
$225-$275
High-tech, tubular steel furniture with laminated tops. Comes in nonglare color finishes. Unit is large enough to hold printer, terminal, monitor, and disk drives.
CIRCLE 305

QUALITY OF LIFE
ENVIRONMENTS INC.
46 Main St.
Orleans, MA 02653
(617) 255-8715
$249 up
Custom made, hand-crafted furniture signed by the cabinet-maker, Dick Stocks. This Shaker style furniture is made of New England white pine. The trestle table holds all the necessary components and comes in three sizes. Options include a cable control which winds cables and conceals them; a CRT elevator; form paper holder; combined power outlet; Plexiglas tabletop cover; utility drawers; and a surge suppressor system. Constructed with mortise and tenon joinery, and forge-struck nails. Separate printer table with an optional paper slot.
CIRCLE 306

R&L MARKETING INC.
P.O. Box 1918
Pleasanton, CA 94566
(415) 945-2075
$219.95
Assembles in 60 seconds with new-type fasteners. Cable tray on back keeps cables off floor; power box also mounted on back so only one cord goes to wall. Casters, and upper and lower storage shelves.
CIRCLE 307

UNIVERSAL INDUSTRIES
1561 N. Bonnie Beach Place
Los Angeles, CA 90063
(213) 269-2117
$100 up
Minimal look in product design. Compact housing for small work spaces. Natural oak or lacquer finish. Accessories available include computer lamp and paper basket.
CIRCLE 308

OFFICE

AMCO ENGINEERING CO.
3801 N. Rose St.
Schiller Park, IL 60176
(312) 671-6670
$350
Input hardware sits on a laminated desk top. Memory storage devices are placed on sides of desk. Security device available. Separate printer stand.
CIRCLE 309

AMERICAN SEATING CO.
901 Broadway NW
Grand Rapids, MI 49506
(616) 456-0600
$1000 up
This is an expensive line of fully adjustable computer furniture. It is available in various configurations to suit virtually any size work area.
CIRCLE 310

BRETFORD MANUFACTURING INC.
9715 Soreng Ave.
Schiller Park, IL 60176
(312) 678-2545
$150-$350
These computer work tables are available in either wood or metal.
CIRCLE 311

CAB-TEK
11 Riverside St.
Nashua, NH 03062
(603) 889-1961
$79-$199
Both Micro Power Bench and Computer Center units come with power surge suppressors.
CIRCLE 312

COMPUTER CONCEPTS
4011-B West Clarendon
Phoenix, AZ 85019
(602) 233-9090
$500 up
These oak and walnut pieces are flexible in design and mobile.
CIRCLE 313

(VOGEL-PETERSON)
COMPUTER MATE
P.O. Box 90
Elmhurst, IL 60126
(312) 279-7123
$484
Custom construction, special paint and/or laminate finishes available. Adjustable VDT platform and keyboard surfaces; rounded corners; choice of right or left side work surface. Easy to assemble.
CIRCLE 314

(THE MAINE MANUFACTURING CO.)
DATA-MATE
P.O. Box 408
Nashua, NH 03061
(800) 258-1768
$450-$1300
Ergonomic series has manually or electrically adjustable keyboard platform. Electrically adjustable VDT platform tilts to desired angle and is controlled by one fingertip switch. The security series was initially designed for school use. Standard workstation comes with plastic security cover that hinges and locks to workstation itself. Steel security cover available. Fully welded steel bases. Angle wedges and casters are options.
CIRCLE 315

FACIT INC.
235 Main Dunstable Road
Nashua, NH 03061
(603) 883-4157
$998 up
Various units have either single or double surface. Locking casters and under-table document storage available. Crank-assist series provides individual keyboard and VDT surfaces, and the unit is right or left-hand adjustable. Options include adjustable shelves, pedestals, and copy holder.
CIRCLE 316

GF BUSINESS EQUIPMENT INC.
229 E. Dennick Ave.
Youngstown, OH 44501
(216) 746-7271
$1000 up
This is panel-supported furniture to which the owner can add shelves as needed. Free-standing storage cabinets are available.
CIRCLE 317

HERMAN MILLER
8500 Byron Road
Zeeland, MI 49464
(616) 772-3300
$200 up

Award-winning designs utilize polished aluminum beams to support work surfaces. These surfaces can be cantilevered above or below the beams, attached to the sides, or placed across the top. Various configurations can be set up, to meet individual needs.
CIRCLE 318

H. WILSON COMPANY
555 W. Taft Drive
South Holland, IL 60473
(312) 339-5111
$153.90
The Basic Mobile Station is fully adjustable and rests on chrome tubular legs. It has slots for air circulation, and has ball bearing casters. Accessories available: monitor shelf, leg extensions, pedestals, two different electrical assemblies, and a security system. Suitable for schools and offices where low cost and security are considerations.
CIRCLE 319

ili INTERNATIONAL INC.
7000 S. Fulton Industrial Blvd.
SW Atlanta, GA 30336
(404) 344-1100
$3300
This all-wood workstation is actually a component system. It has interchangeable parts, and terminal tables with drop-down keyboards. Custom-designed, special printer tables available, as well as casters .
CIRCLE 320

INPUT-EZ CORP.
7330 S. Alton Way,
Unit E P.O. Box 3444
Englewood, CO 80155
(303) 779-5571; (800) 227-0810
$429-$545
This is a business workstation with a patented design. It incorporates a copy holder, raised CRT platform, and terminal stands that can fit onto existing furniture.
CIRCLE 321

KIMBALL OFFICE FURNITURE CO.
(DIV. OF KIMBALL INT'L)
1600 Royal St.
Jasper, IN 47546
(812) 482-1600
$848-$2125
Shipped fully assembled. Traditional and contemporary designs in walnut or oak. Motorized lifts for keyboard surfaces. One unit can

be closed when not in use, so that it looks like a scaled-down roll top desk. Includes a cord-management slot on some models, power cords to floor connection sources.
CIRCLE 323

KRUEGER INC.
P.O. Box 8100
Green Bay, WI 54308
(414) 468-8100
$200-$900
This is commercial furniture with separate and interchangeable units for flexibility and versatility.
CIRCLE 323

LUXOR CORP.
2245 Delany St.
Waukegan, IL 60085
(312) 244-1800
$80-$119
Primarily directed toward the school market, this high-tech, plastic work station is practical and inexpensive. Delivery is guaranteed in five days after receipt of order.
CIRCLE 324

MOBILE-TRONICS CO. INC.
Box 1022
Tustin, CA 92680
(714) 768-4271
$388
Includes Micro Computer Station and Universal Printer Stand units in a variety of colors.
CIRCLE 325

MONARCH COMPUTER PRODUCTS
(DIV. DENNISON MONARCH
SYSTEMS INC.)
P.O. Box 4081
New Windsor, NY 12550
(800) 431-4958
$440 up
This is ergonomically designed, modular furniture that includes terminal and printer stands. The printer stand has a cantilevered work surface and a one-touch central drive adjustment to raise and lower each surface. Engineered to adjust to every angle and inclination. Legs and frame are of heavy steel construction.
CIRCLE 326

NBI INC.
P.O. Box 9001
Boulder, CO 80301
(303) 938-2795; 1-800-NBI-1111
$345 up
Ergonomic office furniture in modular units. Tables offer spring-loaded keyboard pad that adjusts vertically.
CIRCLE 327

NKR (FFP OFFICE
ENVIRONMENTS LTD.)
P. O. Box 816, Madison Square Station
New York, NY 10159
(212) 684-6138
$400
NKR furniture is completely adjustable to allow individual adaptation for improved working comfort; to maximize efficiency and productivity. The compact Mobile Terminal Table has become popular for home use.
CIRCLE 380

PANEL CONCEPTS INC.
P.O. Box C-11953
3001 S. Yale St.
Santa Ana, CA 92704
(800) 854-6919; (800) 422-2101 (CA)
$1500-$2500
Straight, curved, and corner surfaces include special computer placement area with keyboard-level "stepdowns." Rounded edges and laminated surfaces. Pedestals and various type storage drawers and shelves available. IMPAC raceway secures all power and communications cables neatly in place, with covers to match frames.
CIRCLE 328

RING KING VISIBLES INC.
2210 Second Ave.
Muscatine, IA 52761
(319) 263-8144
$350-$500
Optional accessories are available for printout storage and forms. Units can be configured to fit any environmental setup (height, angle, etc.).
CIRCLE 329

SAMSONITE
11200 E. 45th St.
Denver, CO 80239
(303) 373-6426
$500-$800
Various modular components permit custom design of work areas. Assembles easily with a standard screwdriver.
CIRCLE 330

SMITH SYSTEM MANUFACTURING CO.
Box 43515
St. Paul, MN 55164
(612) 636-3560
$200-$650
Security workstation available with a crank-adjustable terminal

table, pull-out keyboard, and lockable cabinet cover. Optional accessories include corner wedge connector, pedestals, drawers, and shelves.
CIRCLE 331

STEELCASE INC.
1120 36th St. SE
Grand Rapids, MI 49508
(616) 247-2710; (800) 392-9930
$650-$1000
Furniture is adjustable in height and angle for both terminal and monitor. Special lighting available as an option.
CIRCLE 332

TIFFANY STAND & FURNITURE CO.
9666 Olive Blvd. Suite 750
St. Louis, MO 63132
(314) 991-1700
$674-$774
Wood and steel components include a computer desk, printer stand, and drive housing in various size units with connector capability. Accessories available.
CIRCLE 333

VERSA TEC CORP.
201 N. Rome Ave.
Tampa, FL 33601
(813) 251-2431
$595
CompuCart is a mobile unit, on casters. All of the computer hardware locks inside the cart, which looks similar to a roll-top desk. This compact unit is two feet square and takes up only four square feet of floor space. It's ergonomically designed with adjustable keyboard height and depth. The keyboard, monitor screen, and work surface are all in normal line of sight.
CIRCLE 334

WILSON JONES CO.
6150 Touhy Ave.
Chicago, IL 60648
(312) 774-7700
$310
Work stations designed for desk height or stand-up reference to a terminal. Units are on casters. Assembly requires use of diagrams, and units are heavy.
CIRCLE 336

COMPUTER FURNITURE

(continued from previous page)

HOME OR OFFICE

ADAMS DESIGN
81 Dayton Road
Chico, CA 95926
(916) 345-2077
$510
Solid oak pieces include a table, printer stand, and a bilevel monitor stand.
CIRCLE 337

A.M. LOVEMAN LUMBER & BOX CO.
P.O. Box 90123
Nashville, TN 37209
(615) 297-1397
$299.50 ($199.95 plus shipping, in kit form)
This furniture can be purchased in solid cherry or oak butcher block. There are two units: a computer desk station and a printer stand.
CIRCLE 338

AMPERSAND INC.
1340 W. Bayaud
Denver, CO 80223
(303) 698-0797; (800) 525-8391
$131.95-$164.95
Unit has shelves and storage areas, including a large drawer. Accepts most keyboards, printers, disk drives, and other accessories. Corner adapter available to form a modular work station. Modular printer stand and keyboard shelf are available.
CIRCLE 339

ATLANTIC CABINET CORP.
Interstate Park
P.O. Box 100
Williamsport, MD 21795
(301) 223-8900
$165 up
Split level workstations house all types of personal computers. Assembled easily with a screwdriver. Extension available to attach to either side of workstation. Unit includes a drawer and lower shelf. It has rear wiring and paper in feed slots.
CIRCLE 340

ATLANTIC DATA FURNITURE
PRODUCT
P.O. Box 151777
4507 W. Alva Ave.
Tampa, FL 33684
(813) 579-3504
$498
Work station has laminated top in a choice of colors. Includes a table with a printer shelf and a CRT connection.
CIRCLE 341

BRANWOOD MANUFACTURING
2929 S. 38th St.
Phoenix, AZ 85040
(602) 276-1811
$550
This solid oak computer work station includes a printer stand and a computer table.
CIRCLE 342

BUSH INDUSTRIES INC.
312 Fair Oak St.
Little Valley, NY 14755
(716) 938-9101
$169.95
Workstation comes with adjustable shelves for monitor and printer, and a storage cabinet. The unit is lockable. A hutch is available as an option.
CIRCLE 343

COMPCO INDUSTRIES
159 W. Walnut St
Painesville, OH 44077
(216) 354-4186
$120.80
This is pressboard furniture, laminated with finished wood. The price includes a work table with a printer slot, a data top, a base, and a fluorescent strip light that fits beneath the data top. Color laminate tops can be custommatched to decor.
CIRCLE 344

COMPUTER ACCESSORY CORP.
8400 Sovereign Row
Dallas, TX 75247
(214) 631-5732; (800) 527-2415
$225-$600
Low-price home units include a table with locking media drawer, monitor shelf, and printer stand. Other home furniture has oak frame and edging and a laminated work surface, locking drawer for software, and workstation returns. Options include an electronics bay beneath the work surface, and a monitor shelf. Office configuration has high-tech, steel leg terminal and printer tables, and optional Plexiglas doors.
CIRCLE 345

COMPUTER FURNITURE &
ACCESSORIES
515 W. 132nd St.
Gardena, CA 90248
(213) 327-7710
$275-$500
Both home and office units can be customized to fit a particular computer, configuration, or work area.
CIRCLE 346

COMPUTER ROOMERS INC.
9219 Viscount
Dallas, TX 75247
(214) 630-0280
$200-$500
Wood-core laminate furniture with modesty panel, cord slots, full side panels, and adjustable work surfaces on some models. No tools required for assembly.
CIRCLE 347

CRATES
773 Miami Circle
Atlanta, GA 30324
(404) 231-0234
$130-$395
The Crate Computer System is a vertical system that includes five components to configure in many ways. Sturdily constructed of composite board with melamine finish, these units are easy to assemble.
CIRCLE 348

DATA SUPPORT INC.
11511 Katy Freeway
Suite 150, Dept. P.C. 1
Houston, TX 77679
(713) 496-0338
$195
Home workstation is constructed of oak; office version is vinyl covered.
CIRCLE 349

ELECTRONIC SYSTEMS
FURNITURE CO.
17129 S. Kingsview Ave.
Carson, CA 90746
(213) 538-9601
$179 up
Components include bilevel desks for Apple computers, and a mini-bilevel desk for the IBM Personal Computer. Welded tubular steel legs have adjustable glides. Options include filler panels for coverage of unused space, desk returns, shelves, turntables, and Plexiglas doors.
CIRCLE 350

FINE TECH FURNITURE INC.
P.O. Box 280
Woodbury, TN 37190
(615) 765-5021
$748
This solid oak furniture has a specially designed shelf system and an adjustable keyboard drawer. It also has a detachable monitor platform. A special line of furniture for corporate work centers has steel legs and casters.
CIRCLE 351

FRONTLINE PRODUCTS
1915 W. Glenoaks Blvd.
Suite 200
Glendale, CA 91201
(213) 884-2249
$450
Computree is an economical, vertical computer workstation. Its interchangeable parts are constructed of steel and aluminum, and are easy to assemble.
CIRCLE 352

F.S.I. INC.
4227 Mercantile Ave.
Naples, FL 33940
(813) 775-6984
$248.50
This furniture may be custom-manufactured to the purchaser's particular specifications.
CIRCLE 353

FUTURE SOLUTIONS INC.
3198 H Airport Loop
Costa Mesa, CA 92626
(714) 556-2252
$204.90-$629.95
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The Electronic Schoolhouse Graduates Better Thinkers

Some people think a personal computer should be as easy
to use as an electric toaster. But you get back what you
put in—and if you're not willing to go the distance,
maybe you shouldn't bother at all

by Kevin Strehlo, Associate Editor

Let's be honest. It's usually tougher for adults to learn to use a personal computer than it is for kids. Part of the difference is that adults sometimes have some unlearning to do first. Having "learned" that they aren't good at technical subjects, for example, they will surrender at the first unfriendly beep from a machine.

Once over such hurdles, though, most adults attain a high degree of computing literacy—the ability to sit down at an unfamiliar computer with unfamiliar software, flip through some documentation, and gain use of a new tool in a relatively short time. Some make it alone, some sign up for coaching before they leap, and some buy software designed to guide them over the unlearning hump to the promised land. All of them would gain from being a bit more like children when their hands are on the keyboard, and in fact some of the better learning aids and teaching methods help them do just that. As children who live for a time in France become effortlessly fluent in French, children put in the right computing environment become effortlessly fluent in computing. We can learn from the fearlessness and playfulness that governs this new country of the mind, and we can benefit by picking up part of its native tongue and style of thinking. Computing literacy will come more easily to those who let "bugs" and "debugging" replace "mistakes"

and "failure" in their vocabulary, and who learn to solve problems—as one child put it—one mind-sized bite at a time.

A struggle toward literacy

Bill Hughes tilted his head back and squinted at the screen of the Commodore 8032 to see why it was beeping at him. All he wanted to do was fix a typing mistake. His instructor, a UC Berkeley computer science student, didn't always remember that his purpose was to help Bill learn to debug his own problems. "It's in command mode," he said, after glancing over Hughes's shoulder.

"What do you mean, command mode?" Bill asked.

"To get out, hit another quote."

After several unsuccessful scans of the keyboard in search of the elusive quotation mark key, Hughes sat contemplating the BASIC syntax error that was still on the screen. It was all Greek to him.

"My mind doesn't go toward computers at all," he explained. "Let's be honest: For me, this is scary."

Just five years before, Bill Hughes traded most of his savings and a 30-year employee pin from the gas company for a shot at the fat part of life's fairway. Within a year it was clear he'd hit one right down the middle with his Hughes Travel Associates, a San Francisco company that arranged group golfing vacations to

exotic places. It was such a success that he knew he'd need a computer. He'd heard a computer could let him handle his paperwork in one-fourth the time.

"I visited computer stores," Hughes said. "The salesmen turned the machine on and ran the processor, produced beautiful looking letters and all that, and said this is what the machine can do. I nodded to show I understood, but when I got back outside, I stopped and said. . . . whaaat?"

Then he signed up for the 60-hour course in Walnut Creek, Calif., determined to learn more than just the answer to the question put by a colorful poster which hung on the classroom wall: "Will someone please tell me what an Apple can do?" The poster then went on to list more than 100 applications packages. Hughes was impatient; he wanted to get right to the ones which could take the thousands of pieces of paper he kept in file cabinets and turn them into mass mailings of personalized letters, accounting ledgers, and itineraries for each client according to his preferences—smoking or non-smoking, extensions to other countries, method of payment, and so on.

"I can see in my mind exactly what I want to do—the lines I need on the screen for my business," Hughes said. "But I'm no programmer. So how do I find the right software?" He was

Children in the right computing environment become fluent in computing.

THE ELECTRONIC
SCHOOLHOUSE
GRADUATES
BETTER THINKERS

"My mind doesn't go toward computers at all. Let's be honest: For me, this is scary."

Deborah Brecher and Marsha Freedman: the Women's Computer Literacy Project.

anxious to finish with BASIC and get on with his spreadsheet training. Maybe that was what he wanted.

Logo makes literacy easy

While Hughes struggled with frustration and boredom, just 100 miles away an eight-year-old named Nate was having the time of his life at Timber Tech, a 23-acre camp located in the Santa Cruz Mountains. The camp was complete with pool, archery range, tennis courts and, on a knoll overlooking all the rest, two computer rooms. Nate played computer games during some of his free time periods. "But the *real* fun is shooting a bow and arrow," Nate said, "and computer class is sort of fun."

Although the triangular "turtle" he had up on his Apple IIe's monitor was pretty dull compared to game graphics, Nate was fascinated. He was writing a program in a language called Logo. To draw a line, you tell
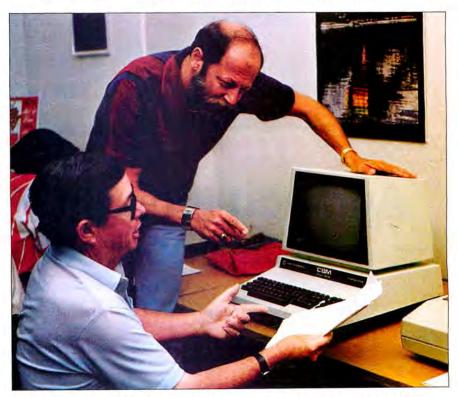
the Logo turtle to put its pen down and walk forward so many steps, Nate explained. Or, you could put it at the top-left corner of the screen by typing "home." You could tell the turtle to make a circle by taking a step and turning, taking a step and turning, over and over until it had gone all the way around. To demonstrate, Nate slowly typed "archleft 360," but the computer said it didn't know how to archleft. Nate tried it again as arcleft 360, and the computer drew a circle.

Nate decided he was going to draw a face—first eyes, then eyebrows, then maybe a nose, he said. He taught the computer "to eyes" in just a few minutes, made sure it worked, then cleared the screen. Teaching it "to eyebrows" went even faster. But when he ran his "to face" procedure, it drew a fine set of eyes only to mess up on the eyebrows—they were sideways, too low, and off to the right.
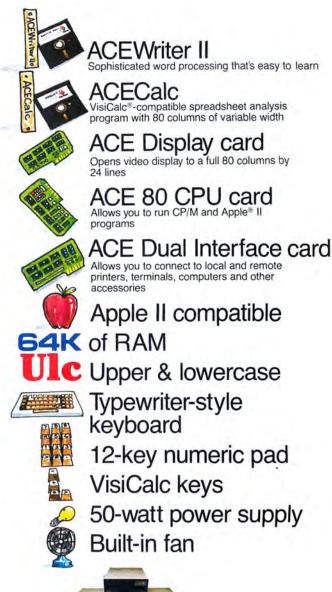
"That's a bug," Nate explained.

Nate's teacher, looking over his shoulder, turned the new but already soiled Timber Tech visor dangling around Nate's neck a half-turn—it seemed to be the only way to get his attention. "What do you think happened, Nate?" she asked.

Nate shrugged and started to figure it out by thinking like a turtle. He went through "to eyes" step by step, turning his body in the chair when the turtle would turn, and found no problem. But when the turtle had finished the eyes and started to draw the eyebrows, they were in the wrong place and facing the wrong direction. Nate changed the end of "to eyes" so it sent the turtle home, where "to eyebrows" expected the turtle to be, and then ran his face routine again. This time, the computer drew eyes and eyebrows in the right places on the screen. Nat smiled, and his teacher asked him what he was going to do next. "Do I have time to teach it 'to nose'?" Nate asked.

Bill Hughes, owner of Hughes Travel Associates, Inc., at the Commodore 8032.

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70   PERSONAL COMPUTING *September 1983*   CIRCLE 21

Nate was having more success with his Logo turtle than Hughes was with BASIC.

One thing is sure: Nate was having a better time and more success with his turtle than Hughes was with BASIC. Part of the difference is that Nate was given some neat phenomena to *play* with—an approach most of the more successful computing literacy courses and aids share. For example, one of the first textbooks designed for teaching computing literacy in the public schools begins with a program that draws a rocketship on the screen, then moves quickly into modifying the initial program to make the rocket blast off. And, in a highly lauded course designed by National Training Systems, Inc. to teach senior executives of United Technologies Corp. how to make effective use of the IBM Personal Computer, the executives move quickly into the middle of a spreadsheet to experience this neat phenomena of what-if games. They enjoy the power of the spreadsheet right away, and are motivated to learn the somewhat tedious skills needed to set up a spreadsheet model. (Bill Hughes might have progressed faster in such a class.) Then, to hone their skills, the executives use the spreadsheet as a decision-making tool while playing movie producers in a simulation game complete with academy awards as a finale.

Another key to Nate's success is the structure of Logo, which encourages the breaking down of problems into smaller, more manageable pieces. This helped when it came time for debugging. Since he'd looked at drawing eyebrows as a self-contained problem, it was easy for him to understand the eyebrows bug when it cropped up. But isn't there a significant difference, some might ask, between Nate's turtle manipulation and what the UTC executives and Bill Hughes want to do with a computer? After all, Nate was programming in Logo, while Bill and most adults will never program. (No sense reinventing the wheel if a good application package already exists.)

Martha Ramirez, coauthor of a computing textbook called *Computer Literacy*, argues that the skills useful in programming are basically the same skills needed to deal with an application program.

"Look at VisiCalc," she says. "Advanced VisiCalc is actually a language, with a simple grammar but more words to learn than ANSI-standard BASIC. People just call it something else. And one of the most popular 'application packages,' dBASE II, is by almost any definition a programming language."

Ramirez is not alone. Fred Gibbons, president of Software Publishing Corp., calls applications packages for personal computers "do-it-yourself" kits, and his phrase basically parallels Ramirez in equating the writing of programs with the using of an application program. Both imply a need for the user or programmer to learn about the tools—to learn the words of the language or the commands of the package—and an advantage in breaking down the problem into smaller subproblems. What better for a do-it-yourself

project than a structured approach that lends itself to debugging if you mess up?

In fact, the benefits of the kind of thinking Nate learned at Timber Tech spread beyond computing. The "top down" or "structured" ap-

Sandra Butler, an administrative assistant, at her boss' HP 125.

Nate, a student at Timber Tech, and his teacher, at the Apple IIe.

proach—that is, the idea of looking at the whole problem with the idea of breaking it up into mind-sized bites—has been shown, in early field tests of the Ramirez book and in studies of the use of Logo done by Seymour Papert and others, to develop basic problem-solving skills that teachers have tried and failed to instill for years. "Kids who can add, and who can even handle equations with variables, can fall apart when it comes to real-world word problems," says Ramirez. "Our test schools are measuring an improvement here."

If you still have any doubts as to whether the kind of thinking Nate was doing will help in the quest to learn how to use a computer, consider the analogy of how such an approach can teach a difficult physical skill. By approaching it in mind-sized bites, it is probable that even you, dear reader, can learn how to juggle.

Juggling

"Theoretical ideas about structured programs, when couched in juggling terms—real body terms—take on new concreteness and power," writes Seymour Papert in his influential book on children, computers, and powerful ideas, *Mindstorms*. Papert goes on to describe cascade juggling, in which there is only one kind of toss: a long, high arc the balls take in both directions.

The first step toward our goal of creating a structured, people procedure, TO JUGGLE—after you have fetched three balls—is to identify and name two subprocedures, TOSSRIGHT and TOSSLEFT. When the command TOSSRIGHT is given to you, our apprentice juggler, it should cause you to throw a ball—which we assume to be in your right hand—over to your left, and catch it when it arrives. TOSSLEFT is vice versa.

Since most readers can perform these actions, we take TOSSLEFT and TOSSRIGHT as given, and go on to define two conditions that will trigger the tossing actions. TOPRIGHT is when the ball is at the top of the toss and moving to the right. TOPLEFT is when the ball is at the top and moving left.

The following procedure should now be self explanatory:
TO KEEP JUGGLING
    WHEN TOPRIGHT, TOSSRIGHT.
    WHEN TOPLEFT, TOSSLEFT.

Now, let's turn this people procedure—borrowed from *Mindstorms*—into a teaching strategy as Papert and other Logo experimenters have done before us.

STEP 1: Verify that you can toss a single ball by tossing a ball from one hand into the other hand.

STEP 2: Verify that you can combine tosses. Try the following with two balls:
TO CROSS
    TOSSLEFT.
    WHEN TOPRIGHT, TOSSRIGHT.
    END.
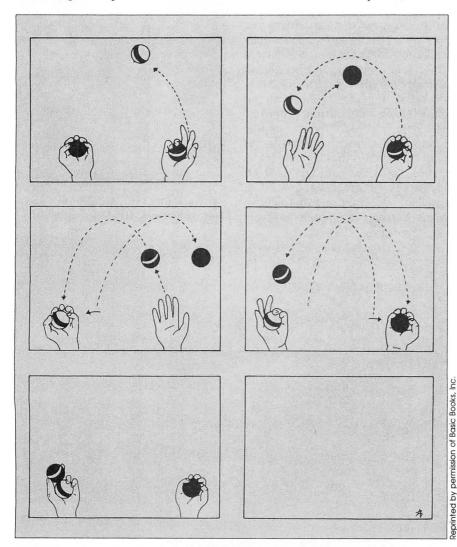
STEP 3: Look for bugs in TO CROSS. Typically, we find that your ability to toss is not as good as it

The idea of breaking problems into small pieces and using debugging techniques is illustrated by using the idea to learn to juggle.

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And dive right in.

Bush began to think that computer professionals had a vested interest in mystifying computing.

seemed in Step 1. The most common tossing bug is following the ball with the eyes. Since a reader has only one pair of eyes, this engagement in the first toss makes the second toss nearly impossible.

STEP 4: Debugging. Assuming that your bug was following the first ball with the eyes, we debug by returning you to tossing one ball and ask you not to follow it with your eyes. Usually, very little practice is needed to be able to perform a toss while fixing the eyes around the expected apex of the parabola made by the flying ball. When your single toss is debugged, you should again try to combine two tosses. You should now be able to do this.

STEP 5: Try three balls. Once you can smoothly execute the procedure TO CROSS, we can go on to three balls. To do this, begin with two balls in one hand and one in the other (see figure). Ball 2 is tossed as if executing CROSS, ignoring BALL 1. The TOSSRIGHT in CROSS brings the three balls into a state that is ready for KEEP JUGGLING. The transition from CROSS to KEEP JUGGLING presents minor difficulties for some readers, but this is usually overcome. Most readers can learn to juggle in less than half an hour using this strategy.

Juggling is an impressive demonstration of the power of the techniques of structured programming to solve problems . . . when it works. In fact, it has been said that Gary Kildall, founder of Digital Research Inc. and author of the CP/M operating system, was so impressed after reading *Mindstorms* and discovering that even he could learn how to juggle, that he began to develop DRI's Dr. Logo for the IBM Personal Computer *himself*.

Papert, borrowing from educational theorist Jean Piaget, says kids learn by building their own theories and models of how things work with whatever appropriate materials they have to work with. The same could be

said of adults, of course, and Corky Bush, dean of students at the University of Idaho and head of the Association of American University Women's Educational Foundation, tried applying the idea to help women become computing literate. Bush believes that if much greater numbers of women don't become computing literate—which she defines as the ability to sit down with a computer and manual and make it do what you want it to—they soon will be at a profound disadvantage in all walks of life. She was quite serious when she equated knitting with computing.

In a report for a committee assigned to deal with the problem, Bush explained computer programming in terms of knitting instructions, feeling it was a model most women would be familiar with. She wrote that a "program" to knit a sweater would specify a certain stitch repeated over and over—analogous to a "do loop" in programming. She added that poorly written knitting instructions might fail to specify when to stop that stitch, causing the knitter to knit forever—analogous to an endless loop in programming. Several women told her that the knitting explanation made the concepts of programming clear to them for the first time.

But Bush was criticized by another woman on the committee. "She was a computer professional, and was incensed that I would belittle computing by using such a trivial example," Bush says. That was when she began to think that computer professionals had a vested interest in mystifying computing, and decided that women needed their own approach to demystifying the subject.

Deborah Brecher, who ran the computer center at Sonoma State University in Northern California, had come to the same conclusion. She quit her Sonoma position after being rebuffed in her efforts to open that center to more students who weren't planning to become professional programmers. And after helping Marsha

Freedman create a mailing list of people nationwide who were interested in various women's issues, with a data base that could be broken down by interest or locale or both, Deborah discovered that women's groups across the country had trouble understanding what they had done, and even more trouble understanding what a computer, in general, could do. After a connection with Corky Bush was made, funding was provided by the AAUW for what became the Women's Computer Literacy Project in San Francisco.

Deborah had read studies that showed boys learned how to play games by following rules, while girls were more likely to learn to play via a holistic understanding of the game. She also knew that despite her knowledge of IBM 360 Assembly language, she had a difficult time learning about new software and hardware until she acquired an understanding of how all the pieces of a computer system fit together. "That helped lift the fog for me; after that, learning was much easier," Deborah says. Thus Deborah designed her course to do more than just teach women to "drive." She took them under the hood and showed them how a computer worked.

Although this emphasis on an extensive overview of the computer runs counter to the prevailing trend in teaching computing literacy, it seems to work for Deborah. "Their success rate has been astonishing," Bush says of the Computer Women's Literacy Project. "Only one person who started the class has dropped out." The class gains part of its effectiveness by residing in the new "structured" country of the mind in which kids learn computing. For example, when the class programs a "robot" to walk to the wall, touch it, turn around and walk back, the women invariably break the task of walking down into the subprocedure "to step." And programming the robot *(continued on page 196)*

Making The MOST Out Of Meetings

You spend the lion's share of your time in meetings.
It's a classic opportunity to use the leverage of
personal computing to make sure those meetings
produce exactly what you want

by Charles Rubin, Associate Editor

Have you ever felt that a business meeting was a waste of time? Maybe the purpose of the meeting wasn't clear, or some crucial information wasn't available, or a few key people didn't show up, or a critical decision was put off, or several items on the agenda weren't covered, or perhaps there wasn't an agenda at all. While there are plenty of potential causes of disastrous inefficiency in business meetings, there's also a powerful ally to combat them: the personal computer. Whether the application is word processing, spreadsheets, data-base management, graphics, or telecommunications, the personal computer is increasingly being brought into use in the battle against wasted time in business meetings.

Good meetings don't just happen. They require a planned agenda, coordination of schedules to ensure everyone's attendance, and clear-cut assignments of each person's responsibilities at the meeting. Nothing brings a meeting to a screeching halt like the absence of important facts or figures, and there's no better tool for storing, preparing, and manipulating facts and figures than a computer.

At Citicorp in upstate New York, vice president Don Fannon is head of technology services and systems for asset-based lending in the industrial credit division. He spends a lot of time in meetings, and he uses an Otrona Attaché computer with spreadsheet, word processing, and data-base management software to make that time more productive.

"Our meetings are pretty well structured," he says. "We always have an agenda, and each person knows in advance what his or her responsibilities are. We don't want any surprises." To help participants prepare for budget meetings, reports and agendas are distributed in advance.

"I have the department's budget set up on a series of spreadsheets," he says, "so it's easy to change the numbers from one month to the next, or even to add new categories for different analyses. Everyone gets copies of the spreadsheets before we go into a meeting. When we sit down, it's clear what we're talking about, because everyone's got the figures in front of them. We can move quickly from one item to the next."
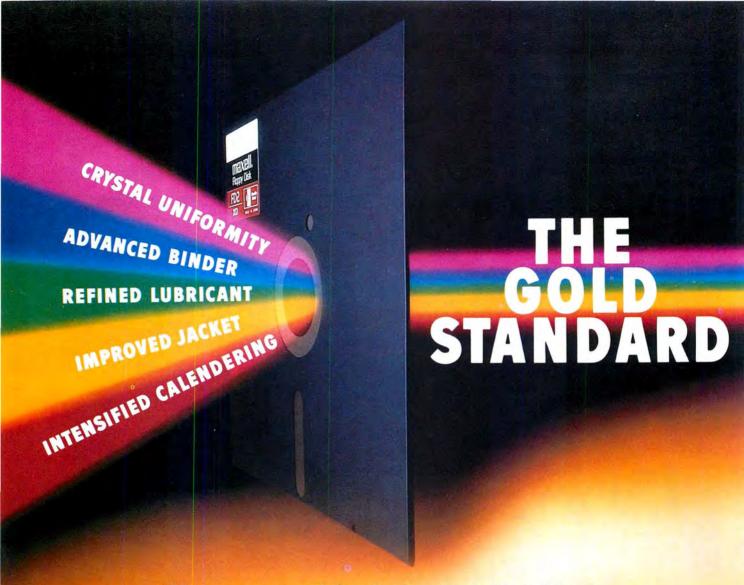
The improved organization of the meeting is especially important during the bank's hectic budgeting cycle, when it may be necessary to cut the meetings short. "With all the budget items laid out," Fannon says, "we're less likely to skip over a critical item on the agenda when we have to shorten the meeting, because it's easy to see the relative importance of the items on the spreadsheet."

During the bank's busy season, there might be as many as three budget meetings a day, and that's when Fannon uses his computer the most. "If we want to recalculate some of the figures between meeting sessions, I just go back to my computer and enter a new formula in one cell of the spreadsheet, and then replicate it wherever it applies," he says. "I can have a new spreadsheet made, printed out, and xeroxed for the meeting in about half an hour, and I don't even have a secretary. Other people who don't use computers have to make the changes by hand, and then have a word processing operator change the printed version."

Fannon relies on his personal computer to help him track projects, too. He uses dBASE II to make sure assignments made at meetings have been carried out. "I made up a dBASE program that works like a scheduling chart, so I can track various aspects of a software maintenance or systems development project as they're completed." Although it's not as elaborate as some dedicated project-management software, Fannon's charting system enables him to stay on top of projects spanning up to 18 months and involving several people.

Fannon's computer is helping him get the most out of his crowded meeting schedule, and the overall reaction has been very positive. While others in the department continue to take the extra step of having their materials prepared by word pro-

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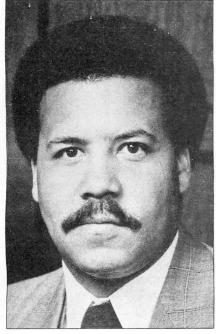
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> **"... the graphics seem to improve my chances of getting support."**

cessing operators, Fannon uses his matrix-printed spreadsheets and reports at meetings attended by officers as high as executive vice president. "With inside materials," Fannon says, "the main thing is for the information to be readable." The improvement in Fannon's effectiveness hasn't been lost on his colleagues. While some diehards are

Kent Fortson, general manager of Rolm, New York, uses PFS:Graph to make his meetings more meaningful.

still using pencil and paper for spreadsheets, there are now several other Otronas in the department, and there's a waiting list for more.

Hitting the nail on the head

Using spreadsheets to present budget material to a group of bankers is a natural way to conduct a meeting at Citicorp, but other personal computer users are finding that computer graphics are the best way to punch up their presentations. Kent Fortson, general manager of Rolm New York, uses PFS:Graph to make his meetings more meaningful. "I transfer the information I want from VisiCalc

files and print it out with pie charts or bar charts on an Epson printer, and then photocopy the printout onto a transparency for an overhead projector." Before he got PFS:Graph last December, Fortson was having his secretary make line graphs to enhance his presentations. "I used to put a lot of numbers on the overheads," he says, "but people were a little confused by all the detail. They're finding the new graphs very clear."

Fortson now uses graphs in most of his meetings; whether it's a quarterly presentation to a group of 50 subordinates or a high-level meeting with a dozen of his superiors. "It's easy to show relationships between different results figures," Fortson says. "I can show targets versus actuals, sales figures, service figures, or growth in our business from the previous quarter. I find the comprehension is much greater among my people, and when I'm trying to sell an idea to upper management, the graphics seem to improve my chances of getting support."

Now that he's not having line graphs done by hand, Fortson is far better prepared for last-minute changes and additions before meetings that used to cause secretarial overload. "It's really a very easy package to use," he says. "In fact, I got the package at the last minute, on a Tuesday before a Wednesday afternoon meeting. I took it home and spent a couple of hours with it, and then made the charts I needed."

If clearer information presentation is an important meeting enhancer in a telephone service company like Rolm, it's doubly important in sales. As national sales manager of the marine electronics firm Furuno USA, David Abbott holds regular meetings in 11 regional sales centers throughout the United States and Canada. Abbott uses his Compaq computer with a package called Graph 'n Calc to create line, bar, and pie graphs for these meetings.

THE TROUBLE WITH MEETINGS
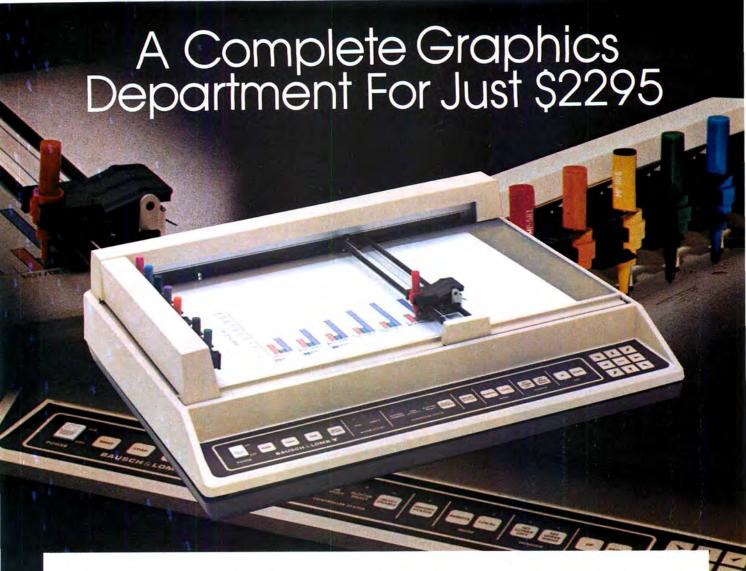
There are lots of reasons why meetings aren't as effective as they could be. Here are some specific problems, with suggestions for how a personal computer can ease (or aggravate) them.

1. No Agenda. A meeting without an agenda is like a ship without a rudder. It's hard to have a good meeting if you don't know what you're supposed to discuss, or the order in which you'll discuss things. Items for discussion should be dealt with in the order of their importance, so the least important items will be the ones omitted if the meeting has to be shortened. It's also a good idea to allot a set amount of time for each topic; the time constraints will discourage unnecessary comments. With a personal computer and word-processing software, the meeting's agenda can be stored and updated so changes can be made.

2. Missing People or Information. All participants in a meeting should be told ahead of time where and when the meeting will take place, and they should be made aware of their responsibilities. A computer can help with preparation of the meeting announcements, assignments, and advance reports. And if a meeting is impossible to coordinate, information can be exchanged by computer conferencing or electronic mail.

3. Distractions. Constant interruptions or distractions can slow a meeting down or derail it completely. Asking others to wait while you retrieve some data from your computer can be distracting, unless you arrange in advance to sit out a part of the discussion in order to do it.

4. No Follow-Through. Decisions made or assignments given during a meeting will be useless if they're not carried out. Project-management software, or even a simple chart, can help organize and track meeting results.

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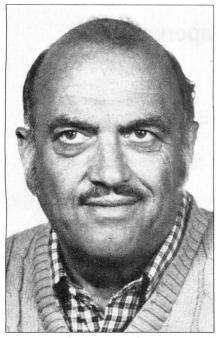
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*" People understand situations
by looking at graphs, and I have
fewer questions to answer. "*

"The program has a built-in spreadsheet," he says, "so I can enter all my sales data and then create graphs from it without transferring data. Instead of showing my people all the details of the spreadsheet, I can produce graphs of results and relationships that mean the most to them. It speeds up my meetings, because a trend will show up very clearly on a line graph. People understand the situation just by looking at a couple of graphs, and I have fewer questions to answer." Any questions he does get can be easily handled because Abbott always carries a copy of

David Abbott, field sales manager of Furuno, U.S.A., uses a Compaq computer with Graph 'n Calc in meetings.
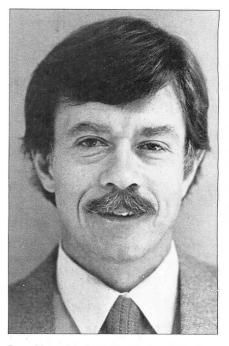
the entire spreadsheet from which his graphs have been made, so he can refer to specific figures.

To present his graphs at meetings, Abbott uses an overhead projector with transparent copies made from dot-matrix printouts of the material. He's considering buying a color plotter which would draw directly onto transparencies, but he's also looking at graphics presentation software

that will allow him to store and access graphs directly from his computer. "The Compaq comes with a color board," he says, "and since it's portable it wouldn't be a lot of trouble to take it into a meeting and set it up with a color monitor." Eliminating the transparencies would spice up the presentations with color, and would also save a step in the graphics preparation.

To keep his staff informed between meetings, Abbott uses a standard company memorandum form he created with WordStar to write and print field sales bulletins. "Because the bulletins are already formatted for our memorandum sheets, it saves my secretary time when she prints out the bulletins for distribution." WordStar also helps him keep his salespeople informed about Furuno's competitors. "Our product line is the largest in the industry," he says. "We have a lot of competitors with products that compete with various parts of our line. I have files in WordStar that help me keep track of which competitor sells what competitive product, along with information about prices and features. New information or price changes are easy to add, so I can include them in the sales bulletins." Naturally, the more he can tell his sales force between meetings, the less ground Abbott has to cover in the meetings themselves.

Computer conferencing

Besides assisting in the preparation, presentation, and distribution of information for meetings and tracking the progress of assignments given in meetings, personal computers can help in another, perhaps more fundamental way: assisting in communication between meeting participants. We tend to think of meetings as events taking place with a group of people in one place and at one time. But what if the meeting participants are in different locations, or in the same location at different times? The communications
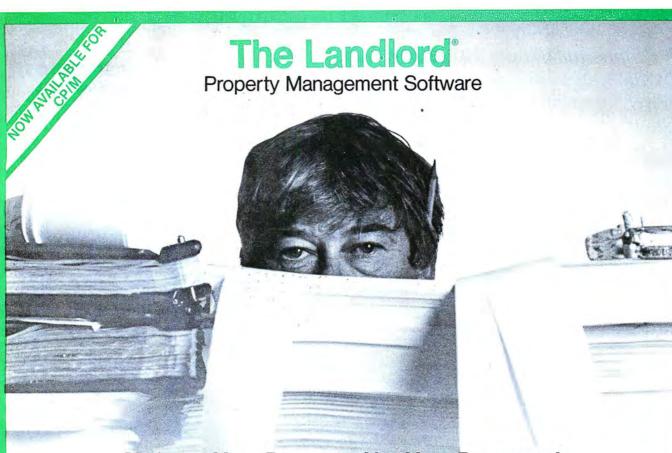
Ron Simard, of the Institute of Nuclear Power Operations, uses Notepad computer conferencing for meetings.

technology now available through today's personal computers, combined with the information demands of multinational organizations, has fostered the computer conference: a new kind of meeting that doesn't have to depend on time, location, or common languages.

At the Institute of Nuclear Power Operations (INPO) in Atlanta, manager of information systems, Ron Simard, directs an information gathering and exchange operation involving some 20 different computer conferences between 500 employees of 85 nuclear power facilities around the world.

"INPO was founded in 1979 by a group of nuclear-licensed facilities in the United States to facilitate information exchanges between nuclear facilities," Simard says. "We wanted an ongoing dialogue about nuclear power issues, to improve industry standards." The problem with INPO's plan was that dozens of different companies throughout the world, each of which might have five

or 10 employees participating in the dialogue, couldn't possibly arrange physical meetings often enough for an efficient information exchange. Commercial electronic mail services available at the time weren't the answer, because although they would allow worldwide users to communicate, they couldn't differentiate between messages the user had already read and new messages, forcing each participant to wade through a lot of memos to determine which information was new since the last log-in. In August 1979, INPO got into computer conferencing by logging onto the Notepad service offered by Infomedia of San Bruno, California.

The super bulletin board

Basically, Notepad works like a sophisticated bulletin board system, but with some important differences. "We run 20 different conferences on various subjects," Simard says. "When a new organization joins INPO, they get a membership in Notepad. Their Notepad coordinator then asks that different people in their organization be given access to the Notepad conferences that are relevant to them." A personnel manager, for example, might have access to the conference on staffing and training, while the plant manager might have access to operations-related conferences. Access is keyed to the user's last name, so no special passwords are needed to access conferences. "Instead of people's first names," says Simard, "we use the name of the company they work for, so people can identify each other more easily. A typical listing might be 'Jones, (PG&E),' for example."

The system runs 24 hours a day, so users can log in whenever it's convenient to them. "When you log in, the list of conferences is displayed, and the ones that have received new information since your last log-in are flagged with an asterisk. You can

SHOULD YOU INVITE YOUR COMPUTER TO A MEETING?

O nce you've begun using a personal computer to prepare graphics or data for meetings, the positive results you achieve may lead you to take the computer along as a full-fledged participant in the meeting itself. After all, if the computer can quickly retrieve data or produce graphics in your office, it can do the same at the conference table. Or perhaps you've considered telecommunicating between the corporate mainframe and the meeting via computer, or speeding up the transcription and distribution of the meeting's minutes by having a secretary use a computer instead of pad and paper. These are just some of the potential in-meeting uses of personal computers; but in deciding whether or not to invite your computer to a meeting, you should consider not only its possible applications, but also the effect its presence will have on the meeting process. Here are some things to think about.

Live spreadsheets at a meeting may sound like a great way to consider various financial options quickly, but unless the gathering is an informal brainstorming session, the computer might not be welcome. Often, high-level meetings are highly structured. Participants receive advance notice of the kinds of information they're expected to bring. In these situations, showing up with the data on a computer disk instead of on handouts for all the participants may be construed as poor preparation. In addition, printed individual spreadsheets are far easier for a group to read than even the clearest monitor. And no matter how adept you are at manipulating the figures, getting the data you want from the spreadsheet will still cause an interruption in the flow of things.

Graphic presentations via computer can likewise create a disruptive presence or reflect unflatteringly on how well you've done your homework—but not necessarily. Some graphics presentation programs allow

quick retrieval of graphs or charts you've created and stored beforehand. You'll have to consider the size of the monitor you'll be using, though, and how well everyone will be able to see it. If you're substituting the computer's graphics for printed handouts, you'll also be making it hard for anyone to take the information presented in the graphics away from the meeting.

Telecommunicating with a mainframe during the meeting will also present visibility problems, and it will definitely be disruptive. On the other hand, if the computer is in a corner of the room, and you can excuse yourself from time to time to get some data that wasn't previously requested, the computer's presence could very well eliminate the need for a follow-up meeting.

Taking the minutes with a personal computer will speed up the process of formatting, transcribing, and distributing them after the meeting, but it will also be somewhat noisier than using a pen and paper. In many meetings, one of the managers participating is chosen to take the minutes, so there might also be a problem with typing skills.

The physical process of moving a computer into the meeting place is also something to consider. Is there a convenient electrical outlet, and a place to set the computer up where it won't look like some high-tech table centerpiece? Naturally, a portable computer will be easier to move, but there's always a trade-off in monitor size.

The bottom line is that, like other aspects of an effective meeting, inviting a computer to take part involves planning and coordination. The computer shouldn't be a surprise gate-crasher, and it shouldn't spoil its reception by turning in a disappointing performance. Any functions you plan for the computer should be readied and even practiced in advance to help minimize delay when the spotlight is on.

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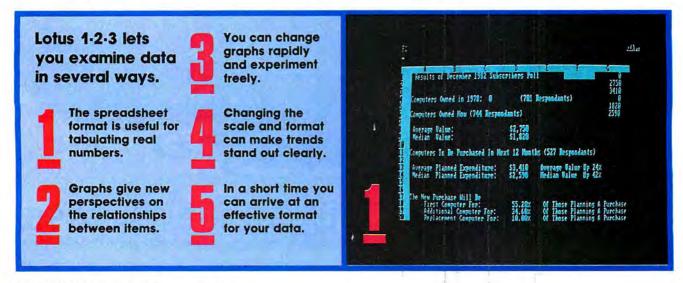
by Paul Bonner, Associate Editor

The presentation he's about to make may be the most important moment in Morgan's career. He's the president of a small firm with a big new idea, and he's about to enter the office of an investment banker who has the power to provide the seed money his firm needs to make a viable attack on an already crowded marketplace. He enters the banker's office carrying only a Compaq computer. He begins his pitch, making projections and illustrating them with spreadsheets and graphs he produces on the built-in monitor on his computer. The banker interrupts, asking what happens if there's a 20 percent variance in this factor and a 15 percent variance in another. Mor-

gan is prepared, and calls up a spreadsheet which shows that even with those changes his plan is viable. The banker asks for more data, on a question that Morgan has not prepared for. No problem, he dials his office, and uses his modem to transfer the data from his computer there and put it onto a spreadsheet in front of the banker's eyes. The banker is admittedly impressed, but says he'll need time to consider everything he's seen and heard. Morgan is amenable, but wants to leave the banker hardcopy output of everything in the presentation, so he suggests lunch. They depart and enjoy a good lunch while the printer in Morgan's computer cranks out the hard-copy the

banker needs to make his decision.

In a little over a week Morgan hears from the investment banker. Yes, of course the money is there. And by the way, would Morgan be willing to give him some advice about computers?

In the business world, everyone makes presentations of one kind or another. And, no matter whether the presentations you make are one-on-one with your boss or a potential investor or customer, or to a large audience of Fortune 500 executives, the basic elements are the same: information and communication. If your presentation is going to be successful, you had better have the most complete information possible on your

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subject, and communicate it in the most effective manner for your audience. That's where your personal computer comes in, because just about every productivity package you have can be exploited to help you prepare and deliver a persuasive presentation.

Data and information

An effective presentation really begins long before you make your opening remarks to your audience. It begins with the behind-the-scenes process of assembling raw data and converting it to information. Your computer, of course, is an excellent tool for collecting data. With a system you can store and organize your records and· then recall them selectively by searching for keywords. With a modem, you can get access to services such as Compu-Serve, The Source, the Dow Jones News Service, and the Legal Resource Index. Rich Baker of the editorial staff of CompuServe describes one way these services can help you research a topic or gain industry information, "We have a service that allows you to type in the topic you're interested in. An organization will then go out and search the many kinds of data bases that are available to you and report back with a bibli-ography that will show you where you can get the information you need."
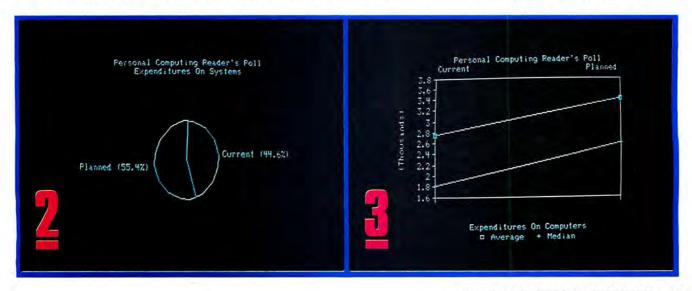
Of course, data by itself has little value. If you drop a 70-page report brimming with statistics and data on someone's desk, the best response you can hope for is "What does it mean?" As Tom Eicker, an analyst with Southern California Edison explains, "It's difficult to teach people who need to make decisions on numbers how to interpret statistical analyses." Eicker uses VisiCalc for simple spreadsheeting of data from customer service reports, then VisiTrend/Plot to perform statistical analyses and correlations on that data, and then finally GraphWriter (Graphic Communications, Inc.) to produce graphs representing the data. He says, "What I'm doing is analyzing data and presenting it in a readable form to high-level managers. A number of the things I'm doing they've not seen before ... Presenting analytical information in graphic form makes it readable for the non-statistician."

The two steps Eicker goes through are key to any presentation: analyzing raw data until it has meaning to him, and then presenting the data in a way that's most useful for his audience. The people who receive his reports are not trained statisticians, and they would not benefit fully from either his raw data or from his statistical analyses. However, Eicker can make his findings valuable to them by using his personal computer to shape his data.

The Informative Computer

In a paper entitled, "Problems of Information Science," M. C. Yovits and J. G. Abilock defined information as "data of value in decision-making." The computer is a powerful tool in the decision-making process precisely because it can be used to convert raw data to information. A big part of that process is the ability the computer gives you to play the what-if game with your data.

Mark Erwin, general manager of John Crosland & Associates, a commercial developer in Charlotte, N.C., uses The Decision-Maker Series of real estate investment analysis soft-ware from Loven-Murphy, Charlotte, N.C. to analyze properties his firm is interested in purchasing or developing. He says, "We put all the information in and make some assumptions regarding the different elements, and then we look at the results and see whether the project is the kind of project we're looking for. It's kind of a threshold decision-maker for us. Having done that, and

It's a fact of life, people believe things when they see them on a computer.

determining that we want to go forward, we use that presentation material to convince others—our lenders and partners—that it's a good investment."

According to Erwin, the software "generates a report that shows the internal rate of return and cash flow from a project, and projects it out for 10 years. Anytime we buy or develop a property we want to make some assumptions and see what it will look like for the next 10 years. A property may not make sense today, but it might get better the next year, and the next, and so on. The alternative to using this program is to crunch the numbers out manually and then transcribe them on a typewriter into report form. That was very time-consuming and labor-intensive when we did it. The same reports we do now in less than an hour used to take us several days or even a week of number-crunching to come up with the same amount of information."

Erwin points out that the advantages of doing these analyses go far beyond labor savings. "It allows us to look at more properties and respond quicker than we could in the past. This way we can look at several different projects and pick the one to pursue very quickly."
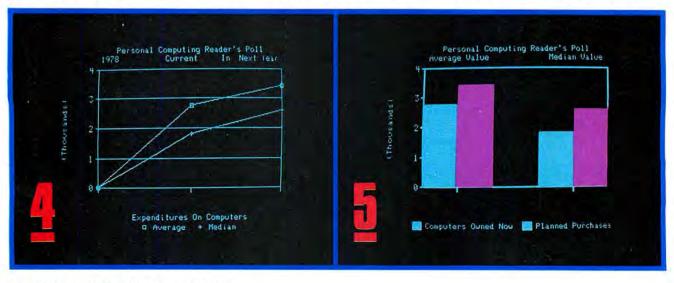
Having made that decision, there's still the matter of convincing lenders and investors to back the undertaking. "Our lenders and investors need to see that the project is going to make sense. So it's absolutely imperative that we do our homework and present it in a concise, professional fashion. This program helps us do that." Erwin notes one additional advantage, "I think the computer presentation shows that we've spent some time and effort researching it and have a professional quality about us—the fact that we do it on a computer instead of scribbling out a few numbers on a piece of paper." Personal computers are still new enough in business to have a strong persuasive effect in and of themselves. As David Burstein, president of the New York Amateur Computer Club notes, "It's a fact of life in the computer business. People believe things that they see on a computer. It's much more convincing when people see numbers on a computer."

When you have large amounts of data to consider, an analysis program tailored to your needs can help you organize that data into useful forms. For instance, commodities options brokers have a constant influx of data from various exchanges. Analyzing this data as it comes in can be overwhelming without the aid of a com-

puter. Jim Katzin is a programmer/analyst with Automated Trading Systems, Inc., which wrote a commodities options program known as OSCAR (Options Strategy, Comparison, Analysis, and Reporting), which is now being used by Prudential-Bache and soon will be available on the open market. According to Katzin, OSCAR "reads all the current options trading in commodities off the ticker in real-time and evaluates them. It calculates their theoretical value based on a mathematical model of what a particular commodity should be priced at, and then prints-out in tabular form whether they're over- or undervalued, the month of maturity, days to maturity and implied volatility. It also plots profit-and-loss, expected rate of turn, maximum risk, and maximum profit on about a dozen different trading strategies."

OSCAR offers users a number of different ways to look at the data it reports. According to Katzin, "The program has screening parameters. For instance, if you're writing options, you don't want to look at any options that are currently trading for less than their theoretical value, so you can screen all those out. Conversely, if you're buying options, you don't want to look at any that are

4 — Personal Computing Reader's Poll
1978   Current   In Next Year
(Thousands)
Expenditures On Computers
□ Average + Median

5 — Personal Computing Reader's Poll
Average Value   Median Value
(Thousands)
■ Computers Owned Now ■ Planned Purchases

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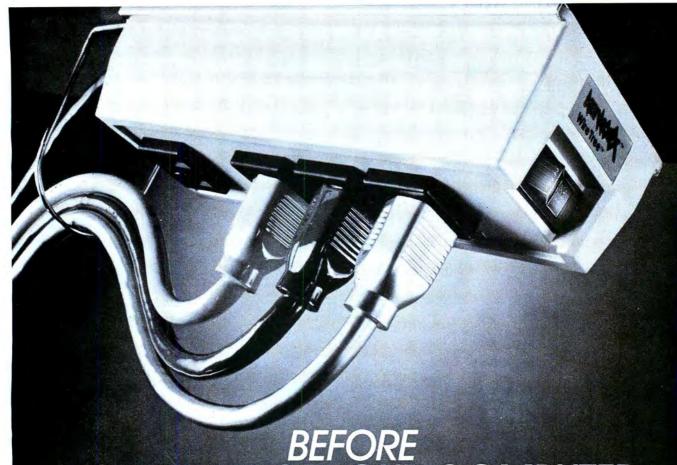
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overvalued. If you don't want to risk losing a lot of money, you can look at any options combination within a strategy where your expected rate of return is above a certain amount or your maximum risk is below a certain amount."

But what if . . .

Another way in which analysis programs can help you convert data to information is by pointing out the relationships between different items. On a standard spreadsheet program, for instance, you can change the data in one cell and then recalculate the spreadsheet to see how that change affects the rest of the sheet. The more advanced spreadsheet programs that are now appearing allow you to go even further. MicroPro's PlanStar, for instance, includes sensitivity-analysis and goal-seeking features. Peter Nielson of MicroPro explains, "Once you've completed a worksheet, you can look at any variable and give the sensitivity analysis command to see how sensitive it is to the various components that affect it. A simple example would be where sales dollars are a function of the number of units sold and the cost of those units. You could run a sensitivity analysis on either of those variables and indicate that you would like the spreadsheet recalculated varying one of the components by a percentage amount you specify. It will then vary that on the positive side, and show you what the effect would be on your bottom line, and then vary it on the negative side by the percentage you indicated and show the results."

Nielson continues, "The goal-seeking feature is the converse, where you have a target output variable in mind. Using the same example, if you've worked through your spreadsheet once and you've got a sales dollar figure but that figure is not what you desire, you can set a target value and then the program will iterate back through the model, zeroing in

on a particular value for one of the input variables that will lead to the targeted sales figure."

Features like this allow you to play out the what-if game to the end. An analyst asked to justify an acquisition can use the goal-seeking feature to determine what changes in various income or expense areas would be necessary to meet an internal rate of return established by his corporation as a threshold level for acquisitions. He could then use sensitivity analysis to determine how sensitive the rate of return would be to fluctuations in specified variables. Most important, he can perform these analyses in a matter of moments once the original spreadsheet is complete. That makes it possible to determine in advance how sensitive his results are to changes in their component values. When his boss says, "This looks fine, but what if third year operating expenses increased by 12 percent instead of 10 percent," he can be prepared for the question and immediately answer, "Even a 13 per cent increase would give us an acceptable return as long as third year income is within 5 percent of our projections."

Picture it

Having completed a mathematical analysis of your data, you might want to look at it one more way—in graphic form—before you plan your presentation. Analytical graphics can give you a new perspective on your data, allowing you to see relationships and trends that might not be readily apparent when you look at tabular data. For instance, a reader survey we completed recently included information on the brands of computers our readers own. Since there were over 50 brands and models mentioned in the survey, a tabular listing of the results took quite a while to analyze. However, when we translated the results to a pie chart, it was readily apparent at first glance that nearly two-thirds of our readers own one of three brands of computers.

Using graphics for your own analytical purposes, or indeed for anything other than a major presentation, used to be prohibitively expensive. Today, however, many business packages have integral graphics functions, and there are many standalone graphics packages available if you want higher-quality graphics. As David Burstein points out, producing graphics on a personal computer saves you time and money while greatly increasing your flexibility: "What you used to have to have a graphics artist do for $200 you can now do on a personal computer and a plotter just as nicely. In fact, you can generate four different variations in half an hour—you can generate one and look at it."

Mike Fruchter, a systems analyst with Bloomingdale's in New York has used the Apple Business Graphics System for about two years to present financial data to the store's buyers and management personnel. He says, "It takes me about 10 minutes to turn out a graph. We used to do them by hand, and it was a mess because the information was always coming in at the last minute and we were always paying late fees to get our graphs out. Now we're able to handle all the information coming in up to the last minute. We usually graph five years of history and one year of plan, and the plan numbers often change right before the presentation. We can handle that (with the graphics software) and get the graphs out."

Now that graphics are affordable, there are a lot of good reasons for using them in even the smallest presentations. As Dan Eilers, product manager for LisaDraw and LisaGraph at Apple Computer, Inc., points out, "A recent Wharton Applied Research Lab study showed the use of overhead transparencies in presentations has several positive side effects: It improves the persuasive impact of the speaker, makes for faster decisions, shortens meetings, and

*A computer-typesetter
interface can cut your
costs by up to 70 percent.*

gives a better perception of the speaker as being more professional, better prepared, more credible, and more interesting."

David O'Conner, Apple's product manager for Lisa applications software, adds, "One of the things we found here at Apple is that being able to use graphic material for informal internal meetings very easily makes a big difference in how the meeting goes. If you just want something informal, you can put out a few slides on LisaDraw in 15 or 20 minutes. We use it a lot for internal meetings, and our experience has supported the research that it makes meetings shorter and more effective."

The purpose of representing your data graphically is to make it easier for your audience to understand. This is especially important when your audience is not familar with your research. Valerie Crane, president of Research Communications, Inc., a Boston-based television audience research firm, explains, "We work primarily with executive producers of television programs who are not research-oriented. We use the Apple Business Graphics Package to present our data to them. It's a very good format to use with people who are in visual communications, because they're obviously very visually oriented."

To present the output from her graphics package, Crane uses Screen Director. According to Peter Stein of Business & Professional Software (Cambridge, Mass.), creators of the program, "Screen Director is sort of an accessory to a regular business graphics package. It acts like a carousel slide projector, making use of the computer's monitor the same way a slide projector makes use of a screen. What it can do is take any kind of artwork that's created on an Apple and create a slide show with it with effects which allow you to cut or dissolve between pictures, and to make word charts or title frames. It sequences all the images you've cre-

ated." Several other business graphics programs have "slide show" features, although few include the special effects features found in Screen Director. In addition, any graphics package that will drive a plotter can be used to create acetate slides for overhead projection, a method that's probably more effective than a monitor display for presentations to large groups.

Slick words

Data gathering, analysis, and graphics are only a few of the ways your personal computer can help you make an effective presentation. So far, we've ignored written presentations almost entirely. But word processing is one of your computer's most powerful and useful capabilities. A good word processor will allow you to turn out a more professional looking and better organized document than you could before, with little more effort than once went into typing a first draft. When changing a document means it has to be retyped in its entirety, there's a tendency to accept minor flaws with a "that's good enough" attitude. However, with a word processor, changing a line or a paragraph is as easy as typing in the change. So when you're going over the third draft of a document and realize that something in the second paragraph could be reworded to communicate your message more effectively, you don't have to think twice about making the change. You can then print your document on a letter-quality printer that produces copy that looks as good as (or better than) materials produced on even the fanciest typewriter.

For an even more professional-looking document, there are numerous ways to have your word-processing output typeset at a far lower cost than is possible without a personal computer. Interfaces are available for several typesetting machines that will allow them to accept data sent via a modem, saving the cost of hav-

ing a typesetter retype your document. If your company doesn't have a typesetting department, there are numerous typesetting firms to which you can mail or modem your word-processing files that will send you back typeset copy, for up to 70 per cent less than manual typesetting. Even if you don't have a word processing program, or you're working on a terminal, you can produce word-processing files that can be converted to typeset copy if you have telecommunications ability. For instance, CompuServe makes a word processor and 128k of free storage available to all of its subscribers.

You can take it with you

In the last year or so, truly portable computers have finally become available. These include lap or briefcase computers such as the Epson HX-20 or the Radio Shack TRS-80 Model 100, and larger, more powerful portables such as those manufactured by Kaypro, Osborne, Compaq, and others. The potential value of these units in presentations has not been lost on the business computer user.
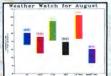
It's not hard to see why any businessman would want a computer that can accompany him when he travels. To be able to walk in and set up your computer on a client's desk gives you a powerful and impressive tool that could well make the difference in whether your presentation is successful. As David Burstein notes, "The customer likes you to come to them, and you also like to go there because you can get a feel for what's really going on. But, in selling software, I also want to show them products on a computer. Very often I can demonstrate a database on the computer and in half an hour show him that it can do what he wants. For me, the ability to take a Kaypro and go to the customer combines the advantages of being able to go to the customer, which you want for the selling situation, and the ability to demon-

When Your Time Is The Bottom Line

For anyone with the entrepreneurial spirit, the hardest job of all is the management—and tracking—of billable time. Using your personal computer is the smart way to make sure your time adds up

by Elli Holman, Associate Editor

Whenever you go to your lawyer or your accountant—anyone who performs a service for you—you expect them to send you a bill. If you're a professional involved in a service-oriented business, you expect to charge your customers or clients for your services. But how can you, the professional, make sure you're getting paid for all the work you do? How can you keep track of work that's being done or has already been done? And how can you assure your clients that they're paying the right amount for the work they've commissioned you to do?

Anyone who works on a time basis knows that in order to keep clients happy, and stay in business, there has to be very careful accounting for everything—every hour, every penny, every person. In some cases, the professional lawyer, accountant, or advertising executive does this manually with pencils, time cards, balance sheets, typewriters, file folders, and adding machines.

If your company is small, with few employees and few clients, you may be well-served by the manual method. But as your business grows, keeping track of the time and money you spend on any project or any client by hand could be a nightmare. You could send all of your project tracking, time-keeping, and billing tasks to an outside data-processing firm which would handle the operation for

you. Or, with a personal computer and software dedicated to this special problem, you could keep all these procedures in-house under the watchful eyes of yourself and your employees.

In most service-oriented organizations, there are typically a lot of employees recording little bits of time

Larry Wilson uses his time and billing system to keep on top of his business.

which have to be accumulated and summarized at the end of a job or at the end of a month. This type of business usually has either a limited number of clients, each having a lot of projects, or a lot of clients and a limited number of projects.

An accounting firm, for example, might have a large number of clients, but work on only one project at a time

for each. An advertising agency, on the other hand, may have fewer clients, but any one of those clients may have more than one project going at the same time.

Take Wilson & Davis Advertising in Indianapolis, Ind. This medium-size agency handles the advertising needs of some national, regional, and local accounts—Delta Faucet, a roast beef restaurant chain, and a local furrier, just to name a few. All told, they currently have 17 clients.

Unlike much larger agencies who sometimes separate their staff into "creative" and "account management" departments, everybody who works for Wilson & Davis (all 11 employees) works on every account.

"There is some structure, but not much," says Larry Wilson, a partner in the firm. "We have copywriters, account managers, art directors, and media buyers, and in some cases those jobs overlap. For instance, I'm an account manager, but I'm also a writer."

Since many people may be working on several different accounts or projects at one time, not being able to accurately track the time that each person spends on any given project could mean problems down the road. If time is not recorded, then it's not billed. And if it's not billed, then the agency doesn't get paid for their work.

Wilson & Davis used to keep track

of their entire business by hand. With a limited number of employees and clients, it seemed like a logical way of doing things—but not for long.

A change for the better

As the agency grew, so did the paperwork. Client billings were going out on the fifteenth of every month instead of on the first. And since the profitability of the business is measured in the amount of time employees spend on each project and on each client, cost accounting was falling two to three months behind. The time spent accounting for clients and projects climbed to 40 hours a week—a full-time job.

Wilson and his colleagues decided to go the route of many businesses these days, and computerize. They studied the market looking for something that would improve their situation, while still staying within their budget.

"A lot of agencies have computer programs," Wilson says. "Unfortunately, they are gigantic agencies who put thousands and thousands of dollars into equipment and then place that same amount into programming their system. We couldn't find anything that really looked like it would work for us for under $25,000."

Then Wilson met Brian MacIntosh from Microbase Software Incorporated, in Indianapolis. Now, an $895 package for the IBM Personal Computer, MSI/Time And Billing, has changed the way Wilson & Davis run their business.

MacIntosh's system is designed for small businesses whose operations are based on time. Most of these service-oriented firms bill their clients on a per-hour basis. A particular kind of work, done by, say, a high-level employee, costs the client more than if it was done by a lower-level employee. Consequently, the firm must carefully track not only the amount of time, but the level of time spent on each part of a client's particular job.

"Our system," says MacIntosh, "actually accepts the time records in hours and then calculates the charge that should be made for the service that was rendered. For example, there may be four or five employees recording time—they may be doing the same kind of work or they may be doing different kinds of work. The system will allow them to enter their time records separately, and then it accumulates the data in a meaningful fashion to produce an invoice that's suitable to send to a client."

But before all that . . .

But there's more to it than that. The crucial part of the system is based around a "billing worksheet" which comes out prior to billing. "It's probably the most important document in the whole system," says MacIntosh, "because it provides a detailed listing of all the time and kinds of charges that were incurred on the project."

The billing worksheet goes to the person, or persons, responsible for that particular client, to review and sign-off on it. He can say, "Yes, I want to bill that client that much money for the job," or "No, these charges aren't right. We missed some time. We're billing too much for these items. I don't want to bill it this way." Either way he has the opportunity to change the billing procedure then and there to ensure that the client is being billed appropriately and accurately.

"Because you use a uniform method of reporting time," says MacIntosh, "and typically you require everyone to report all their time, you can be sure your bill is accurate. If you lose 15 minutes here and an hour there, it can add up.

"In the test site we used," says MacIntosh, "they cut their billing cycle down from taking about two weeks to get invoices out to about two days. Actually, the system could do it in one day, but there are some manual steps involved in verifying all the data prior to producing the invoices.

So all the turnaround time is with the people, and not with the computer itself."

Office expenses, says MacIntosh, also go down because the system handles so much of the routine billing operation. This benefit has proved extremely valuable for Wilson. Not only do his bills get out on the first of every month, thus improving his cash flow, but the employee who formerly spent 40 hours a week chasing time can now take on extra responsibilities in the agency.

"She used to spend 40 hours a week doing our billing and accounting—now she spends 15 hours a week," Wilson says.

This reduction in manual workload saved Wilson the expense of an additional employee. "I definitely would have had to add another person to continue to do it manually."

Sure we can

"To know whether a particular client or job is profitable or not, the time has to be computed by the cost of each person and the factor of overhead that we operate with here," says Wilson. "We've always been able to do it, but we've had to do it manually—and that part of our business was running further and further behind, so it was two or three months before we knew whether the client was still in the profitable area or we were way off. But now we know instantly."

The program helps. "Now, at the end of every month, on every job, we get a printout that shows exactly how many man-hours were spent, who spent them, what the cost of those man-hours is, and what the overhead factor on it is," he continues. "If we are spending more time than we are getting compensated for, we have records to lay out in front of the client to show them that his project has taken this many hours."

Wilson says another important advantage of the billing worksheet is its availability. It's always kept in the

files, so if a client calls and says, "Hey, I've got a question about my invoice," the worksheet can be pulled and the inquiry can be answered immediately.

"Any time a client calls and wants to know where we stand," says Wilson, "we can just punch the buttons and go out there with the worksheet, and show them exactly who we wrote the purchase orders to, and which ones the bills are already in on, and how many hours have been spent, and where we are on the estimate—all of which we really couldn't do if we were still using the manual method."

Time and Billing is also helping Wilson to schedule his people better. "Now that we've got running time records, we can look at each person and really get a better feel about how much capacity we have in man-hours available to work on getting clients and doing projects for existing clients," he says. "It is going to be very helpful with staffing."

"We can look at the printout and find out that a person doing layout or copy should be able to record 1600 hours a year against clients," he says. "The rest of the time is vacation and regular office time."

Knowing the capacity of his agency is helping Wilson increase his business. "I know right now that we could do another 1600 hours worth of work this year," he says. "These hours are available for existing clients or new clients."

"I'd like to add one or two new clients a month," he continues. "With this system, we can tell when we need to add people and when we don't. When we go out to talk to prospects, we know that if we've got a really big client on the line who requires a lot of hours, we can look at our hours and figure out if we have enough time available for him, or if we're going to have to add people to do it."

At the legal firm of Layman, Jones & Dye of Newport Beach, Calif., the problem was gaining more control over billing procedures. "We had

This report from State Of The Art's package shows billable time for each employee over the last 12 months and is primarily used to forecast workloads.

used an outside service, and while for the most part it was adequate, there were times when we felt it would be nice if we could control it inside," says Joyce Sahagen, legal administrator for the firm. "We also wanted to be able to bill our clients at will, rather than on a delay."

A healthy business
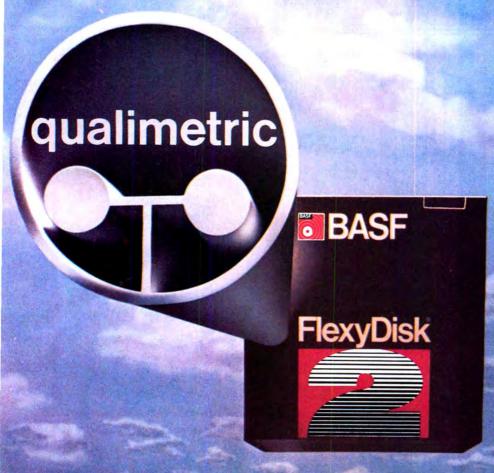
The firm, which consists of five attorneys who handle the real estate, business, and corporate legal matters of about 300 clients, already had an Apple II personal computer which they were using to run general ledger and accounts payable systems from State Of The Art Inc. They went back to the company for their $795 package, Professional Time And Billing.

The package, specially designed for service firms such as Layman, Jones & Dye, has given Sahagen the control she wanted. "Our standard billing is a monthly billing. However,

there are certain clients who like to keep track of where they are. We are now able to bill some clients weekly if they want it," she says. "Also, if a case is closed, we can bill it out immediately rather than waiting until the following month."

In addition to helping out her clients, Time And Billing helps Sahagen keep track of time spent inside the firm. "We are able to get our time input almost on a daily basis," she says. "The attorneys turn in their time sheets every day, so we can show what the unbilled time is—on any matter—whenever we want."

In contrast, the outside service firm that used to handle the time-keeping and billing tasks for Layman, Jones & Dye would input data weekly. "We never knew where we stood until the first report came back," Sahagen says. "This way, we can print out the time right away and the attorneys can make corrections. At the end of the month, the billing

I need an overall view of how my staff bills and how productive they are.

process is much faster because we can make corrections as we go along."

Analyzing the data

After all the time and projects have been entered into the system, State Of The Art's package allows the professional the option of analyzing where his firm stands. The software allows for analysis reports to be printed out in three different ways.

The first report gives the user an analysis by employee. "In the system, you can specify different levels of employees," says Jim Hennings, director of professional markets for State Of The Art. "For example, in a law firm you might have partners, managers, associates, clerks, and paralegals. You can specify each of these levels and do a productivity report that is organized by the level of the employee. You can determine what the total billable hours were for that level of employee, what their target hours were, and what their nonbillable hours were—things like going to lunch with a client, vacation, sick leave, and time off."

The second level of analysis that Professional Time And Billing can provide is by employees who have management responsibilities. "If I'm a professional," says Hennings, "I may have some staff people working for me, all of whom bill on a specific project. But I need an overall view for myself, because I am responsible for these staff members, how they bill, and how productive they are."

The third way to look at the analysis is by project. "You may want to look at a client and his list of projects to find out what the total fees billed are for those projects, expenses billed, what the total billed should be, and what has been billed to date," Hennings continues. This report gives the user a feel for how much time he has spent on a project, how much money he has been paid, and how much he can expect to get paid for that project.

09/30/84		YOUR FIRM M-T-D EMPLOYEE BILLING STATUS					PAGE: 1	
RESPONSIBLE EMPLOYEE	TOTAL WORK	+---BILLED---+ TOTAL	%	+--------UNBILLED--------+ FEES	EXPENSES	%	
PARTNER							
ALAN K. FOSTER	14,568.21	14,390.25	99 %	125.00	52.96	1 %	
PAUL J. WILSON	14,879.00	13,250.00	89 %	1,475.00	154.00	11 %	
ROGER D. TOWNSEND	12,105.00	12,105.00	100 %	.00	.00	0 %	
*** LEVEL TOTAL ***	41,552.21	39,745.25	96 %	1,600.00	206.96	4 %	
MANAGER							
SHARON A. HALL	10,382.00	9,932.00	96 %	450.00	.00	4 %	
ASSOCIATE							
JIM BROOKS	6,570.50	6,570.50	100 %	.00	.00	0 %	
PETER DOUGLAS	9,334.50	9,334.50	100 %	.00	.00	0 %	
SALLY W. MEYERS	7,338.90	7,338.90	100 %	.00	.00	0 %	
*** LEVEL TOTAL ***	23,243.90	23,243.90	100 %	.00	.00	0 %	
CLERK							
JANICE TAYLOR	2,403.00	2,383.00	99 %	20.00	.00	1 %	
LISA NOLAN	1,545.00	1,545.00	100 %	.00	.00	0 %	
MELANIE COOK	1,388.00	1,383.00	100 %	5.00	.00	0 %	
*** LEVEL TOTAL ***	5,336.00	5,311.00	100 %	25.00	.00	0 %	
*** REPORT TOTAL ***	80,514.11	78,232.15	97 %	2,075.00	206.96	3 %	

State Of The Art's employee billing status report shows the total percentage of recorded employee time that is billed and unbilled.

Another advantage to the project analysis report is that the user gets a realization percentage for that project. "If I can bill $50,000 on this project," says Hennings, "and I have billed only $40,000 to date, I have a realization percentage of 80 percent to carry over to the next billing."

Keeping it current

"Generally, a professional has full control over what he bills each month," says Hennings. "He may have $10,000 worth of fees to bill his client, but he only wants to bill $5000 because he knows that is what the client will pay this month, and he also wants to save another $5000 for next month.

"That's one of the main attributes of an in-house system as opposed to a service bureau," says Hennings. "Every time you go through an iteration of a billing cycle at a service bureau, you pay for it. It gets to the point where you say, 'I'll just have to go with what I have here instead of making it perfect.'"

A common problem found both in manual systems and outside services is turnaround time. Sometimes your bills are processed late, as with Wilson & Davis, and sometimes you can't process them when you want to process them, as with Layman, Jones & Dye.

Hollday & Temkin Accountancy was having both of these problems. Before they had State Of The Art's system up and running in their Santa Monica, Calif. offices, they were relying on an outside service to track not only their time but their cash receipts and billing. Before that they used a manual system.

With over 200 clients and about 10 people reporting time on a semimonthly basis, Hollday & Temkin needed a system that would keep all of their data current. "It was taking too long," says Joe Hollday, a partner in the firm. "Using the computer

We've helped more kinds of people buy more kinds of computers than any other store in the world.

gives us the ability to bill our clients more often. We can start pulling time that we know has been done during the first half of the month and bill it before the beginning of the next month."

By billing their clients on an ongoing basis, Hollday & Temkin can maintain a constant flow of incoming monies, instead of waiting for clients to get around to paying their bills. "With the nature of the beast that we have in the industry," says Hollday, "by the time the work is done in the beginning of the month, and by the time it gets billed, taking into account the normal bill collection cycle, we could be out 90 to 120 days before we can collect on any of our work. We expect to cut that time down significantly."

Accounting for time

Depending on the size of the account and the nature of the work being done, there may be more than one accountant working on a client's work. "For certain clients we may be handling six or seven different projects at the same time, so in addition to the person in charge of the account, there may be several people underneath him who are inputting time," says Hollday. "Sometimes at the end of the month, when we get our work-in-progress report, we kind of wonder how many people there are in the firm. It seems that everybody is charging time to only my jobs."

But everybody does have to account for their time spent somewhere. "Everybody has to come up with at least an eight-hour day," says Hollday. "If they only have three hours of charges, they have to at least account for the other five hours, whether it is administrative or nonchargeable. If they were on vacation, that counts for eight hours of nonchargeable vacation time. We keep track of this so we can track the efficiency of our staff."

At Hollday & Temkin, time is recorded in tenths of hours, but it is not always recorded the same way. "I

```
09/30/84                          YOUR FIRM                          PAGE:   1
                    M-T-D EMPLOYEE PRODUCTIVITY REPORT

                                                        --NON-BILL HRS--
   LEVEL /                 BILLABLE  TARGET   % OF    PROD  NON-PRD BILLABL
   EMPLOYEE                 HOURS    HOURS   TARGET   HOURS  HOURS  HOURS %

 PARTNER
   AKF  ALAN K. FOSTER         55      88     63 %      5      0     92 %
   PJW  PAUL J. WILSON         77      88     88 %      3      8     88 %
   RDT  ROGER D. TOWNSEND      58      88     66 %      5     16     73 %
                            -------  -------  ----   -------  ------- ----
          *** LEVEL TOTAL ***    190     264     72 %     13     24     84 %

 MANAGER
   SAH  SHARON A. HALL        113     132     86 %      5      8     90 %

 ASSOCIATE
   JB   JIM BROOKS            136     159     86 %      0     16     89 %
   PD   PETER DOUGLAS         141     159     89 %      2      8     93 %
   SWM  SALLY W. MEYERS       137     159     86 %      0      0    100 %
                            -------  -------  ----   -------  ------- ----
          *** LEVEL TOTAL ***    414     477     87 %      2     24     94 %

 CLERK
   JT   JANICE TAYLOR         136     159     86 %      0      0    100 %
   LN   LISA NOLAN            146     159     92 %      0      0    100 %
   MC   MELANIE COOK          109     159     69 %      0      0    100 %
                            -------  -------  ----   -------  ------- ----
          *** LEVEL TOTAL ***    391     477     82 %      0      0    100 %
                            -------  -------  ----   -------  ------- ----
          *** REPORT TOTAL ***  1,108   1,350    82 %     20     56     94 %
                            =======  =======  ====   =======  ======= ====
```

The employee productivity report is used to analyze the productivity of employees by comparing billable hours to total hours worked and target hours.

don't think there is anybody in this office with billing responsibility who really bills the same way, or keeps track of how they want to do things the same way. The good thing about using this system is it gives us flexibility. If it doesn't, somebody is going to be unhappy."

Part of this flexibility is in the ability to enter service codes for the different kinds of work that the firm does. "We may be doing an examination of books or records, or reviews of financial statements, or tax and financial planning. If we are preparing tax returns, we like to know whether it is for individuals or for non-individuals—corporations, partnerships, and so forth. If we are responding to some kind of governmental audit, we want to know whether it is federal or state. Within these categories, we try to keep track of all the time."

After all the time is tracked, it has to be billed to the client. "We basi-

cally have a standard rate per individual," says Hollday, "but there are certain times when we will use a different rate depending upon the kind of work we are doing."

Years ago, Hollday & Temkin kept track of all their time manually. "Everybody would fill out a time sheet, just like they're doing now, and the time would be posted to a work-in-progress book. These figures were extended either by whatever the standard rate is or the standard rate for that particular job, and a list was made up," Hollday says.

"None of that has really changed," he continues. "Computers have just speeded up the process. They've also helped us get a much better hold on what our people are doing and when our heavy client time comes up.

"The only thing that we have to sell is our time," Hollday concludes. "I would hate to have to think of going back to the old days of keeping track of this manually." 🖫

With all the clamor about personal computers, a fundamental fact is often overlooked: some simply *work* better than others.

Consider the COMPAQ Portable.

A computer will make you more productive. A computer will make you more efficient. You hear it everywhere. But you don't hear about which computer actually *works* best.

A computer isn't magic. It's a tool. And just like other tools, some computers work better than others.

The COMPAQ™ Portable is a combination of 20th-century electronics and 19th-century pragmatism. It simply does personal computing better. Here's why.

Works in more places

You don't do all your thinking in one place. Why have a computer that stays in one place?

The COMPAQ Portable has all the capabilities of a large desktop computer. But now those capabilities can go where you go.

You can move it from office to office to share its resources. You can move it into the conference room to answer questions when and where they come up.

With the COMPAQ Portable, you can be as productive in your hotel room or your lake house as in your own office. It's a reliable companion on a business trip. It's a powerful sales aid in your customer's office.
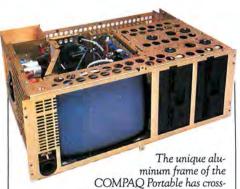
What's more productive than a computer? A computer that works for you in more places.

Works with the greatest number of programs

The most important consideration when you choose a computer is "what programs will it run?" And that's one more reason for choosing the COMPAQ Portable.

The COMPAQ Portable runs more programs

The COMPAQ Portable was designed to fit under a standard airline seat so you can take it on business trips.

The unique aluminum frame of the COMPAQ Portable has crossmembers that strengthen it front-to-back, side-to-side, and top-to-bottom. It's a design practice commonly used in race cars.

than any other portable. In fact, it runs more than most non-portables. That's because it runs all the popular programs written for the IBM® Personal Computer. There are hundreds of them. They are available in computer stores all over the country, and they run without any modification, right off the shelf.

Imagine the power of a *portable* word processor. There are dozens of different word processing programs available for the COMPAQ Portable.

Planning, problem-solving, and "what-ifs" are a cinch with a variety of popular electronic spreadsheet programs. The COMPAQ Portable runs them all.

There are accounting programs for anything from computerizing your family budget to full-scale professional management of payables, receivables, inventory, and payroll for your company.

There are programs for making charts and programs for communicating with other computers. Or if you want something really specialized, there are even program languages for writing your *own* programs.

So, you get portability and you don't give

up problem-solving power. The combination adds up to the most useful personal computer on the market today.

Works better because it's easy to read

The display screen of the COMPAQ Portable measures nine inches diagonally. It shows a full "page width" of 80 characters on a line so tasks like word processing are easier. And those characters are big enough to read even if you're leaning back in your chair.

The display shows both high-resolution graphics and easy-to-read, upper- and lowercase characters. One screen

There are hundreds of useful programs for the COMPAQ Portable because it runs all the popular programs written for the IBM.

for all the information. With some personal computers, including the IBM, you can have either the graphics or the legible characters, but you can't have both unless you buy two different displays.

Incidentally, computer prices are often quoted without a display. The display of the COMPAQ Portable is built in, of course.

Add-on options make it work the way you work

Inside the COMPAQ Portable are three open slots. Electronic devices called expansion boards fit those slots and give the COMPAQ Portable new powers.

Just like the programs, expansion boards designed for the IBM work with the COMPAQ Portable, so there are dozens available right now. With them, you can make your personal computer more personal.

Want to check a stock price? Or look up something in The New York Times Information Service? One expansion board enables the COMPAQ Portable to handle those communications over ordinary phone lines.

Want to use your company's central computer files while you're on a trip? There are boards that allow the COMPAQ Portable to communicate with a variety of large mainframe computers.

Other boards let you hook up controllers for computer games or increase memory capacity. Still others let you connect personal computers in a network so several people in your office can share the same information.

Inside the COMPAQ Portable are three slots for optional electronics that can add new capabilities. Most portables have none.

Works better because it's tough enough for the road

Portable doesn't just mean smaller. Portable means tough, too.

The COMPAQ Portable was built to withstand the hard knocks of constant travel. An aluminum frame within the case completely surrounds the computer's working components. Each disk drive is mounted in rubber shock absorbers instead of being bolted directly to the frame.

To test internal components, the COMPAQ Portable was subjected to impacts of 40 G's *while running a program*. After impacts on each side, there was no internal damage and the program was still running. Without error.

Computers are for getting rid of worries, not giving you new ones.

Designed to help you work better, too

The COMPAQ Portable was designed to *feel* good.

Specifications

Software
☐ Runs all the popular programs written for the IBM PC

Memory
☐ 128K bytes RAM
☐ Expandable to 640K bytes

Storage
☐ One 320K-byte minifloppy disk drive, second drive optional

Display
☐ 9-inch (diagonal) monochrome screen
☐ 25 lines by 80 characters
☐ Upper- and lowercase, high-resolution text characters
☐ High-resolution graphics

Expansion board slots
☐ Three IBM PC-compatible slots

Interfaces
☐ Parallel printer interface
☐ RGB color monitor interface
☐ Composite video monitor interface
☐ TV RF modulator interface
☐ Communications interface optional

Physical specifications
☐ Totally self-contained and portable
☐ 20"W × 8 1/2"H × 16"D

The keyboard is detached so it can fit into your most comfortable working position.

The keyboard cable remains connected at all times. So you don't have to unpack it and hook it up every time you use your computer.

Because the display is built in, the COMPAQ Portable makes a neat, small package on your desk, instead of a big obstacle you have to talk around. The built-in display also avoids the usual cable clutter because there's no need for separate cables for the display.

The COMPAQ Portable even has an electronically synthesized sound to create the familiar keyclick of a typewriter. With a simple keyboard command you can adjust the volume to suit the level of background noise in your office.

The added usefulness is free

The COMPAQ Portable can do what desktop computers do and do it in more places. But it doesn't cost any more than an ordinary desktop.

In fact, it costs hundreds less than a comparably equipped IBM or Apple® III. The COMPAQ Portable comes standard with one disk drive and 128K bytes of memory, both of which are usually extra-cost options. A second disk drive and additional memory are available to make your COMPAQ Portable even more powerful.

The bottom line is this—you just can't buy a more practical, useful, productive computer. Before you decide on a computer, you owe it to yourself to compare the COMPAQ Portable.

For the location of the Authorized Dealer nearest you, call 1-800-231-9966.

COMPAQ™

The most computer you can carry

Swapping Data

The big deal in data swapping is that it's no big deal. In the first article in a series, we'll show you how it's done—and the benefits of doing it

by David Gabel, Senior Editor

Data compatibility. The phrase rears its ugly head whenever you say you want to use two different kinds of computers in your department. Apple disks aren't compatible with IBM disks. TRS-80s can't read CP/M disks. The conclusion? If you want computing in your department, everyone has to use the same kind of computer and, some say, the same software.

Wrong!

You *can* make different brands of computers communicate with one another. There are ways of doing it that involve hardware or hardware/software combinations, or just software alone. You can swap data within your department, or you can use the services of outside providers. But you can do it.

How is this possible? Everyone knows that different computers have different file formats, and those formats can only be read by computers with the appropriate software. The software to read disks resides in the operating system, implying that to share data computers will, at least, need the same operating system. And there are hardware differences as well. Some disks store data at 48 tracks-per-inch, some at 96 TPI, and some at a lesser density. How can you get around that problem?

These are just a few of the arguments you'll hear when you say that no one in your department should be

force-issued a standard computer, but that some choice should be allowed. Again, data compatibility is the issue. It sounds like a convincing reason to institutionalize your department's computing. But the people who use this argument just don't know the facts. Data swapping is easy.

Earnest Mau swaps data files between his Apple and a Morrow computer using a hard-wired connection.

Think of the methods of data exchange as being arranged in a series of tiers, from reasonably simple to relatively complex. At the lowest level of complexity is the lowly modem. It's an inexpensive piece of equip-

ment that converts serial data from your computer into data that can be sent over the telephone line. So if you want your computer to speak with Sam's computer at the other end of the office, you simply get a modem for each computer.

Modems come in all shapes and sizes. There are modems designed for specific computers, and modems that will work with any computer. The basic idea is to take from your computer data presented in parallel, convert it to serial, and then convert that data to a form compatible with the telephone lines.

If you're using modem transfer inside a company, then the problem isn't too difficult. You simply hook the modems onto the telephone that runs through the local private branch exchange (PBX). You dial the extension to which the receiving computer is connected, and proceed with your data transfer.

Well, it's almost that simple. The first problem you run into involves the telephone you use every day. There's a cable coming to that phone that looks like a hawser for mooring the Queen Mary. The reason it's so big is because there are wire pairs inside it to handle all the extensions on your telephone desk set, to light the signal lights, and to activate the hold button. If you look at any simple modem sold at retail today, you'll find it has a telephone company mod-

ular jack on the connecting cable. That's supposed to hook into your telephone, but there's no way that can happen if you're operating on a PBX; you need a connector adaptor or some other way of making the connection.

Fortunately, there *are* other ways. Radio Shack sells a simple device to install between telephone-line connectors allowing you to hook up a modular jack in parallel with the telephone trunk line. It even has a switch that lets you select one of four lines into your phone. The really nice thing about this little part is that you can't mess up the connection; all the connectors are indexed so there's only one way they'll go together.

Once you've made this connection, you're in business. Simply switch the device to the telephone line you want to use, make sure the person you want to call has done the same, and make. your call to start the data swapping. By the way, you're required by FCC regulations to notify the telephone company of any non-standard equipment you put on the telephone line.

There are still other ways

If you'd rather not mess with phone installations, there's yet another alternative. Just get a modem that connects directly to the telephone handset, or get one with an acoustic coupler. These devices don't require a lot of connecting, but they get your computer onto the line just like a direct-connect modem. Some people may argue that an acoustic coupler will subject your data transmission to error, because noise can leak around the sealing cups and interfere with the beeps the coupler translates your data into. That's true in theory, but in practice we've found no problem working with an acoustic coupler.
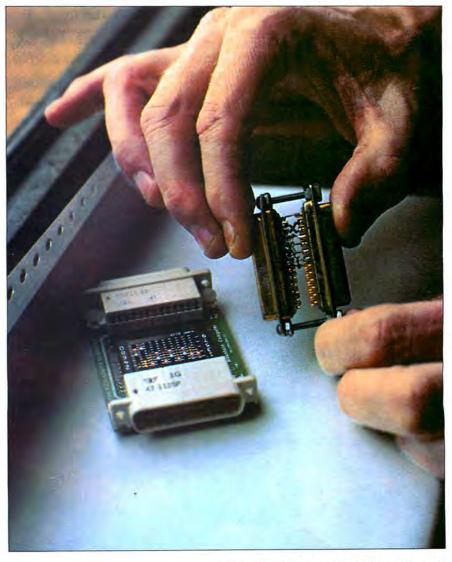
Anyway, now that the connection

Mau took care of RS-232-C port matching by wiring connectors back to back and strapping several pins together to defeat incompatible handshaking lines.

has been made, the next thing you have to worry about is how the computers are going to communicate with each other. You need some software that will make the computers act like data-communications terminals. There are lots of these software packages around, ranging from the very simple to the very complex.

You'll need to do some experimenting to make the computers talk to each another. When you start this experimentation, be prepared for the unexpected. When we first tried it at *Personal Computing*, we were shipping data from an Apple II Plus to a

Radio Shack TRS-80 Model III. We had been using a program called Datacapture 4.0, from Southeastern Software, New Orleans, La., for Apple-to-Apple communications, so we figured that getting to the Model III wouldn't be too hard. Well, it proved to be more of a problem than we thought, because the communications program that Radio Shack sells, the Model I/III Communications Package, was far too sophisticated for our needs and our understanding. In fact, the documentation proved to be way above our heads. We wound up sending text from the

Apple to the Model III that appeared as graphics characters on the receiving computer.

What to do? We called someone who knew what was going on, one Marty Winston, who had worked for Radio Shack in Fort Worth, Tx. He told us to get a program called Commwhiz, from VolksMicro Computer Systems in Williamsburg, Va.

We bought it, and sure enough, it worked. We could understand the documentation, and text flowed freely between remote Apples and the TRS-80 in our New Jersey office.

In fact, the DataCapture program and Commwhiz were very similar, because each goes from initial boot to terminal mode, and then lets you access menus for the functions the program provides. Since the TRS-80 keyboard and the Apple keyboard are different, the operations aren't identical, but the basic procedures are similar. For example, Datacapture puts you into the menu when you hit the Escape key. Commwhiz gets there when you press the SHIFT/UP ARROW combination.

We even transferred data from the TRS-80 to Apples located in the same office. The Mod III had a SmartModem 1200 attached, and the Apple had a Hayes MicroModem II, so transmission was limited by the latter modem to 300 baud. Our managing editor was using the Model III, while copy preparation took place on the Apples. So a writer working in California, say, would write his story on an Apple word processor, and send the story to New Jersey. The editor would then edit the story using Scripsit, the word processor he had on his Model III, and send the story to an Apple in the office for final copy edit and formatting.
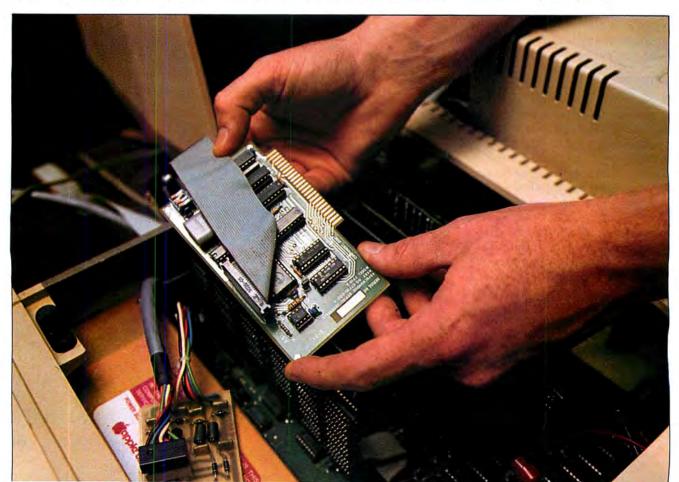
That's when we found out we couldn't do that. We could transfer the straight text with no problem. But Scripsit did something that our Apple-based word processors didn't like at all. If the editor used Scripsit to change the file he received, our Apple word processor, PIE Writer from Hayden Software (Lowell, Mass.) refused to open the file once it was transferred to an Apple. The file could be received, printed, saved, and transmitted, but if Scripsit got hold of it, school was out.

Had we put sufficient time and energy into this problem, we could have solved it. But we didn't. We wound up using the Model III as a convenient communications terminal, but not as an editing tool.

The point of all this is that you can transfer text files to your heart's content. However, other programs that

A serial board performs parallel-to-serial conversion and handshaking protocols. This one, for an Apple II Plus, is from California Computer Systems.

operate on those text files, particularly word processors that are fond of putting interesting control characters into the files, might do something that will have you tearing your hair out until you can solve the problem.

The second tier

Next in complexity—the second tier—is the hard-wired connection. Instead of using a modem on each computer and tapping into telephone lines, you literally join two computers together with a series of wires that will remain connected with a relatively high degree of permanence. The advantage here is that you don't need modems. Modems cost at least $100 each, so eliminating two of them isn't a bad idea. The disadvantage to this kind of scheme is its lack of flexibility. You can connect two computers together, but what if you want to connect a third, or a fourth? That won't work unless you add some software to control the whole thing, and that's the subject of another part of this story—local networks. So the hard-wired connection will work, with the understanding that it works with two computers at a time, and no more.

But for some people with some applications two may be all that's required. Ernest Mau is one of these people. He's a documentation specialist who works out of his home in Aurora, Colo. Mau started computing early on, when Altair computers were all the rage. He still has his old Altair, but he's added an Apple II Plus and a Morrow Decision I. He uses the Morrow for word processing, and the Apple for a number of things, one of which is data communications.

"I like the Morrow for its keyboard," says Mau, "and because I can run WordStar, which is the best word processor I've found for my needs. But I also have to do a lot of time-consuming things with computers, and I don't want to tie up the Morrow with them. So I send files to my Apple and let it do the work while

```
TELENET
516 8I

TERMINAL=D1

@C 30138

301 38 CONNECTED
Connected to THE SOURCE
> ID TCP444
Password?
TCP444 (user 26) logged in Friday, 01 Jul 83 11:31:40.
Welcome, you are connected to THE SOURCE.
Last login Wednesday, 29 Jun 83 15:23:24.

(C) COPYRIGHT SOURCE TELECOMPUTING CORPORATION 1983.
->

WELCOME TO THE SOURCE

1   USING THE SOURCE
2   TODAY
3   BUSINESS UPDATE
4   THE SOURCE MAIN MENU
5   WHAT'S NEW
6   COMMAND LEVEL

Enter item number or HELP 6
-> MAIL TCP444
Version 6.47 SOURCEMAIL

Subject:SAMPLE TRANSMISSION

Enter text:
This is a sample of sending electronic mail on The Source. After you type in
your message, you simply enter the send code, as I will do at the conclusion
of this message. Your mail is sent to your addressee automatically. Then you
can read messages that others have sent to you.
.s
Wait...

Delivered to - TCP444

<S>end,<R>ead,<SC>an,<D>isplay, or <Q>uit?R
From: TCP444    4-Lines
On:01 JUL 1983 At: 11:34
To: TCP444
Subject: SAMPLE TRANSMISSION

--More--

This is a sample of sending electronic mail on The Source. After you type in
your message, you simply enter the send code, as I will do at the conclusion
of this message. Your mail is sent to your addressee automatically. Then you
can read messages that others have sent to you.

Disposition:d
<S>end,<R>ead,<SC>an,<D>isplay, or <Q>uit?q

-> OFF
TCP444 (user 26) logged out Friday, 01 Jul 83 11:37:44.
Time used: 00h 07m connect, 00m 09s CPU, 00m 04s I/O.

Wait...
Bye

301 38 DISCONNECTED
```

You can access electronic mail through public bulletin boards like The Source. This printout tells you how to log on, send, read, or delete messages, and log off. In this case, the log on was accomplished through Telenet, the national time-sharing service, by dialing the Telenet local access number. C 30138 directs Telenet to connect you to The Source. Most communications programs give you the option to automatically download messages from the bulletin board and either store them in memory or save them to disk.

Reach out and byte someone!

Your desk-top computer system is only a beginning — plug a low-cost UDS modem into the RS-232 port and a whole new world of communications opens up!

UDS modems add a new dimension to personal computers. For professional use, a modem permits two-way, hard-copy communication between home office and branches or among the branches themselves. Electronic mail becomes a reality. Sales, cost and inventory updates can be sent over ordinary telephone lines at economical, after-hours rates.

When you use your computer for personal applications, the modem allows you to access up-to-date market information, receive news and weather summaries, check airline schedules or even electronically scan out-of-town newspapers. Long-distance game playing and computer-age personal correspondence become instant realities.

The wide range of UDS modems includes one that fits your requirement perfectly. Top of the line is the micro-processor-based 212 A/D which communicates at 0–300 or 1200 bps, stores and automatically dials up to five 30-digit numbers and includes a complete prompting menu and full automatic test capabilities. Yet, with all these features, it costs only $745. At the other extreme is the $145 103 LP, offering simultaneous two-way communications at 0–300 bps without an AC power cord. This unit siphons operating energy directly from the telephone line!

In between is a large variety of units — many of them in the LP no-power-supply design and all fully FCC certified for direct connection to the telephone system.

Don't be a computer hermit — treat your system to a UDS modem; then you can reach out and byte someone! For details, contact your favorite computer dealer or Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/837-8100.

Universal Data Systems

MOTOROLA INC.
Information Systems Group

*The message in all this
is that you can swap data files
to your heart's content.*

PROFESSIONAL/
MANAGERIAL

I'm doing something else on the Morrow."

Puzzle crafter

Early in his career as a computer-using writer, Mau started doing word puzzles, which he sells through syndication to a number of publications. He started by working on the puzzles, and soon got sufficiently interested that he began designing them. After some had been designed, he sent them off to a puzzle-book publisher,
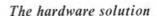
Mau does his principal work on a Morrow Decision I and then transfers the files to his Apple for further processing.

and they were accepted. The publisher said he'd buy as many as Mau could deliver.

It wasn't long before the job of turning out puzzles became overwhelming, and Mau decided to computerize the operation. He wanted to program his Altair to do the puzzles, and got right to work on this challenging task. "After hundreds of hours of testing, revising and rewriting program routines, I made it!" he says. "I had programs and modular routines that would produce typed, sellable-quality word-find puzzles to any desired size, with any desired combination of parameters,

and from any word list or any combination of word lists stored on diskette." Mau says that when he was doing all this by hand, he had several thousand master word lists.

He still had one problem, though. He couldn't provide graphical solutions to the word-find puzzles, because that required circling the words in the grid. What to do? Well, it's a long story, but he finally overcame the difficulty by using the Apple to do the graphics that circle all the words, and then dumping the graphics screen to a printer.

Mau can tell the program on his Morrow what kind of word-find puzzle to generate. (He replaced the Altair because of maintenance problems, although it's still sitting there and can be used if required.) The computer builds the puzzle and stores the parameters for it on disk. Then Mau sends the puzzle parameters to the Apple on a hard-wired link, and the Apple takes over, freeing Mau to use the Morrow for other work.

The hardware solution

The hard-wired connection goes from either the auxiliary port or the printer port on the Morrow to a California Computer Systems serial card installed in the Apple. The auxiliary port can send as well as receive data, while the printer port only sends. Both the ports are connected with an RS-232 cable, but the cable had to be modified. "I fixed the cables," says Mau, "so that lines 2 and 3 feed through directly from one computer to the other, and so do lines 1 and 7. These are signal lines and ground lines. But I had to nullify the handshaking lines, so I plugged two connectors back to back, and used a small wire to strap the handshaking lines together. I used this line to tie together jumper pins 4, 5, 6, 8, and 20. Pin 4 on the Morrow is always high, so in effect I'm holding all the handshaking lines high. If I didn't do that, the computers wouldn't work properly, because they don't neces-

*"If you need any help, just press '?'
and the program will list all
the commands on the screen."*

sarily use the same handshaking signals. Holding those lines high solves the problem."

But that wasn't the only difficulty. The Apple and the Morrow run at different speeds, so timing was a problem. "I wound up putting a delay at the end of each line I'm sending," Mau says, " and I also send character-by-character. I use a program called P-Link in the Morrow. It's a public-domain CP/M program that's available from the remote CP/M bulletin boards."

There was still the issue of getting the Apple to accept data coming over the line. "There's a program that comes on the DOS 3.3 disk," says Mau, "called Make Text. It allows you to build an ASCII text file from the keyboard. It seemed like a simple thing to modify that program to make the Apple read characters that were coming in over the RS-232-C port. So that's what I did. Using this program the way I modified it, I can get about 1000 lines of text into the Apple before it starts "garbage collection." It took me about six hours to figure out what to do about that, but I finally got the timing on the CP/M machine set so it waits while the Apple is involved in its memory clearing."

(Applesoft BASIC has a strange way of handling strings. If you assign the value "dog" to A$, and then "cat" to A$, the value "dog" isn't written over. It stays in memory, and so do all other string assignments. These can eventually fill up the memory. So Applesoft periodically checks to see if memory is becoming full, and if it is, it calls "time-out," and cleans memory. Aficionados call this memory-clearing "garbage collection." You can force garbage collection more frequently by executing the statement X=FRE(0) every now and then inside your program.)

Mau got his P-Link program modified by Gary Shaftstall, who runs the Lakewood, Colo., R-CP/M bulletin board. These R-CP/M sites serve as

distribution centers for much of the public-domain software that runs under CP/M. Shaftstall modified the P-Link to take care of the port handling of the Morrow Decision I computer. "Moving data from one computer to another is really easy," comments Shaftstall. "There are several programs available that let you do it, like Move It from Woolf Software in Canoga Park, Calif. All you do is configure the software for each computer, get it up and running and the computers connected through serial ports, and follow the directions on each computer screen."

Moving data everywhere

Sandy Woolf, vice president of Woolf Software, which markets Move It, says the program was designed as a file-transfer program. "It emulates a terminal, too, so you can use it to talk to The Source, for example," she says, "but we really designed it for moving files back and forth between connected computers. You just boot it up on both computers (the program runs on about 50 computers that use CP/M, and also runs, in another version, under MS-DOS) and enter the commands to get it going. If you need any help, just press "?" and list the commands on the screen."

Mau doesn't have his three computers all hooked together at the same time. His Altair is almost unused now—he's thinking of getting a hard disk and using it as a kind of network controller, but that's in the future. For now, his hard-wired connection seems sufficient.

Notice that in this case you don't need a modem. All you need are the appropriate cables to link the computers and the software to get the connection working, along with the interface. Of course, you'd need an interface to your modem if you were to go that route, so this hard-wired approach might prove to be a practical one if your data-swapping needs are limited to communicating with one other computer.

But suppose that's not enough. Suppose you need to send files from your computer to several others around the country, and you need to receive files from a number of computers. You can use a central electronic-mail service to accomplish this. The Source provides a good example.

The Source is one of several public bulletin boards or data banks to which people can subscribe for a nominal fee. One of its services is electronic mail.

Electronic mail on The Source is quite easy to use. Every Source user is assigned an ID number, which is also the number of the user's "mailbox." If you want to send a "letter" to another Source user, simply log on (directions for logging on are contained in The Source user's manual) and get to command level. Then enter MAIL<destination user ID> at the command level prompt, and follow the directions the computer gives you. A sample of a Source log-on for electronic mail is shown in the box on page 107.

Multiple capabilities

As you can see from that sample, you can do more than just send mail to another person. After I had sent the sample to myself, I deleted it from my mailbox so I wouldn't have to pay for storing it on the computer. In addition to sending and deleting, you can scan your mailbox for the amount of mail you have waiting, you can send multiple copies to different people, you can send blind copies, or you can make use of a host of other possibilities. All you need to access The Source's electronic-mail facilities is a subscription to The Source, (the subscription costs $100 and is available from many computer stores) and a modem. Then you're in business. The Source doesn't really care what kind of computer you have—it's an equal-opportunity communications device.

We've talked about this particular

bulletin board because it's the one most familiar to us. It's not the only one available though. Visit your local computer store and you'll find out all about public bulletin boards.

There are other alternatives in the world of electronic mail. Although they are few in number, more electronic-mail providers are getting into the act. One of them is Omnet, in Boston, Mass.

Mail without extras

Omnet, unlike The Source and CompuServe, provides electronic mail only. The beauty of this system is its compatibility with any kind of system that can send serial ASCII data. Omnet users can connect to the electronic mail system with personal computers, dumb terminals, word-processing hardware or almost anything else. The system accepts ASCII text data, so any such data would be fair game.

Dr. Robert Kirk, a program scientist at NASA's Goddard Space Flight Center, is an Omnet user. "I just got an Epson QX-10 computer," he says, "but up to now I've been using a mini-terminal from Computer Devices to enter text for scientific reports." Kirk is an ocean scientist at Goddard. He tries to determine what kinds of ocean monitoring satellites should be put into orbit. His work involves him with other ocean specialists all over the country.

"My typing isn't very fast," Kirk says, "so I don't really bother with the line editor on the terminal. After I've entered the rough copy for a report, then I want to get it to my secretary, who uses a big Lexitron word processor. All I do is log on to Omnet through Telenet, and Omnet passes me through to Telemail. (Telemail is the Telenet electronic-mail capability.) Then I just send the text I've entered on my terminal from memory or from tape through telemail to my secretary's attention, and she can pick it up from there on her word processor."

Kirk says he could have set up a way for the terminal and the word processor to talk directly to one another, but he didn't want to do that. "My terminal communicates at 300 baud," he says, "and the word processor talks at 1200 baud. So that's a problem. And I didn't want to have to bring the word processor down at specific times to receive data from my terminal. If the report is in the electronic-mail system, then my secretary can get it at the time that's best for her."

P-Link—a public domain program modified by Gary Shaffstall—does the actual file transfer, running under CP/M on both the Morrow and Apple computers.

Robert Heinmiller, who is vice president of Omnet, says anyone can use the system as easily as Kirk does. "What we do," says Heinmiller, "is buy Telenet service wholesale, and then sell it retail. If you buy a subscription to Telenet, you encounter a big financial overhead, and they expect you to format the system for your needs. What we do is cut the overhead and manage the system for you. We wind up being a little cheaper than The Source, but that system has late-night rates we can't beat. "The nice thing about our system,

though, is that we've thought it through. We've made it easy to use. We ruthlessly enforce our user-name convention, for example, so you address people by their name, not some made-up "handle" or a user ID like you do on The Source. It's easier. We've seen examples of corporations that have set up electronic-mail systems that just don't get used, because they're too complicated."

Heinmiller says the average user pays monthly bills of less than $50. "I'm not surprised," concurs Kirk, although he says he makes fairly heavy use of the system. He does more than transmit material to his secretary. When he concludes a study proposing a new oceanographic satellite, like the color-imaging satellite he's working on now, he puts the study report on Telemail for simultaneous delivery to a number of scientists across the country. He gets feedback from them on the same medium. "I have a guy in California whom I talk to regularly," he says. "He uses an Apple. We communicate just fine."

If you don't like the options presented so far, you might think about building a local area network. Much has been written about local area networks and what they can't do, but one thing's for sure—they will allow you to swap data batween any computers that can be connected to the network. And the number of computers that can be networked increases almost daily. IBM Personal Computers can be networked through Ethernet from 3 Com and Omninet from Corvus. Apple will soon have its Apple Net, an Ethernet-like network, available for the Lisa, and for the Apple II and III shortly thereafter. IBM's announcement of a network for their Personal Computer is said to be imminent.

Local-area networks are something of a bone of contention in the industry, because they are being espoused by some as the solution to all office-automation problems. While it's true that networks can do some things very well, they aren't cure-alls. But they will allow you to get data from one kind of computer to another, provided the computers will interface onto the network.

It wasn't until recently, for example, that Apples and IBM Personal Computers were able to connect onto an Omninet network. To make Omninet, or any network, work you need an interface card to hook the computer to the network, the network wiring itself, and controlling software.

Why network software?

The software is needed to prevent message collisions on the network. It works like this. If station A and station B want to transmit a message over the network at the same time, both computers will place their messages out on the wires that connect the network stations. Since electrical signals will appear everywhere on the network almost instantaneously, the two signals will be present at the same place and the same time. There has to be some way of sorting out the

WHAT IN THE WORLD IS ASCII CODE?

It's pretty clear that you can swap files made up of ASCII text from one computer to another. That's fine, but just what *is* ASCII text?

ASCII stands for American Standard Code for Information Interchange. It's really nothing more than a way of making the binary digits the computer uses for storage represent the symbols we use for written communications.

The full set of ASCII characters can be represented in seven bits. Seven bits, each of which can have only two values, 0 and 1, can represent 128 different values. The ASCII set needs 128 values because it represents the lowercase letters and the capital letters for a total of 52, the digits from 0 to 9, adding ten more, and control characters for devices like printers which need to perform functions like page skip, line feed, and so on.

Most user manuals for peripherals that use ASCII text contain a chart showing what each of the ASCII codes means. For example, Appendix A of the Epson MX-80 manual shows ASCII characters for all 128 number combinations.

One example from that chart is the BEL character. BEL is the character that will make a terminal or printer sound its bell (or speaker) when the character is received. The ASCII code for BEL is 7, expressed in decimal notation. In binary notation, 7 is 0000111. Thus, all the numbers in seven bits, from 0000000 to 1111111 account for all the decimal numbers from 0 to 127, or 128 discrete numbers. These represent the 128 ASCII characters.

Communications programs, for the most part, expect to get characters sent to them in ASCII. The exceptions are few, and are found principally in the IBM mainframe world. So you need ASCII text to send files from your computer to another, because everybody understands ASCII.

Personal computers have an 8-bit or 16-bit data bus, which means that words for personal computers all con-

sist of at least 8 bits. That's very convenient for data communications, because it allows for the addition of a single bit that can be used to determine the accuracy of transmission. This bit is called a parity bit. Parity can be of the even or odd variety, and it works like this.

The sum of all the bits in a word will be either even or odd. If you've invoked even parity, your computer will look at each digital word going out on the line and add a bit to the word that will make the sum of the bits even. Suppose you were transmitting the letter b, ASCII 98. The binary representation of 98 is 1100010. The sum of the bits is odd. Your computer will tack on a 1 in the high-bit position, giving a word of 11100010. When the receiving computer, which must also know that the transmission is using even parity, gets the word, it will add the bits together and see that the sum is even. Then it knows all is OK with that byte, and gets ready for the next one. If, on the other hand, one of the bits changed state during the trip, the receiving computer will note that fact and request a retransmission using one of several possible protocols.

If you don't set parity, and you use all 8 bits of the data word for data transmission, you can get into some problems. Some computers use the eighth bit for graphics characters, or for an alternate character set. So the easiest thing to do is configure your data-communications program for 8-bit words, plus even parity. If the receiving computer isn't performing parity checking, then it will just throw away the extra bit. If it is, then you have an error check. Defeating the handshaking lines will leave the computers no way to signal one another about garbled transmission. In that case, the parity bits will just be thrown away. If that doesn't work, then use 7-bit words and no parity for both computers. That way there's no possibility of getting funny ASCII characters through.

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two signals, in much the same way as a radio receiver sorts stations coming into the antenna, or else the network has to make sure only one message travels over the wires at a time. Collision prevention is the way local networks do it.

While local networks vary in the way they handle collision prevention, Omninet sets up its network as though the computers were all engaged in conversation. If there were a number of people in a room all trying to converse with each other, for example, they would all be alert to whether someone else was talking. When a person who wanted to say something detected a lull in the conversation, he would start to talk. Omninet works the same way.

"Omninet is on the transporter card that hooks the computer into the network," says Marc Warshaw, Corvus's network product-line manager. "The transporter cards all listen to see if there's a message on the line. If there isn't, then a station that wants to talk places its message on the line. Now suppose you have two stations that are separated by some distance. A station which wants to transmit could put a message out while there was already one on line, but before the second transmitter heard it. In that case, both messages will get garbled, and the error checking in Omninet will detect that the message wasn't properly received. Then all stations back off from transmitting, and they start again in random fashion, just as people will in a conversation."

Omninet can handle different computers and can transfer data files from one to the other. The computers presently supported are the IBM Personal Computer, the DEC Rainbow, the Apple II and the IIe. Corvus also has hard disk drives that serve as shared file resources, and a printer server to handle printing for the network. A new product, The Bank, uses video-tape technology to store up to 200 Mbytes as data backup.

The Omninet network has a utility program as a part of its system controller that temporarily stores messages in a sort of format-free state. This utility, called Pipes, is the vehicle used for communications between different computers. "Pipes is a sort of common meeting ground," says Warshaw. "One computer can spool to the Pipes area, and another computer then can despool the information there."

This is all fine, but there's a catch. While your computer may be able to receive data from another computer, what will happen once your software gets its hands on the data file your computer received? Everything might go beautifully, but then again disaster is a possibility, because almost every kind of software expects something different from control characters. Word processors, in particular, are very fond of putting control characters into text files, planning to use the control characters later on to control a printer.

The LAN problem

The point is that while local area networks will solve the text-file swapping problem, they may not in themselves solve much more than that.

To swap data on a local-area network, you need several levels of compatibility. The most fundamental is probably hardware compatibility. All the hardware has to connect to the network. Someone has to provide that connection for you—you're not likely to want to go into the computer components business. Next must come the networking protocols. These are nothing more than rules of transmission. What line will handle the data? How will message collisions be avoided? How will a station signal the network controller when it is ready to send, and how will it be notified that it is to receive a message? Finally, there's message compatibility. Do all messages being sent have the same format? Does every station understand the parity rules

the network will use, if any? The questions go on and on.

"The problem is complicated," says Bill Krause, president of 3Com, a company that manufactures Ethernet for the IBM Personal Computer. "First you have to provide the physical connection, and we've done that. But then you have to make sure everything else is compatible. Suppose, for example, you had two different computers, and you wanted to swap data between them without a network. If one had 5¼-inch floppy disks, and the other had 8-inch disks, it wouldn't work. You'd have to standardize on one or the other. The analogy in networks is protocols, and the emerging standard is the Xerox Network Standard protocol. We're subscribing to XNS, and so are Apple, VisiCorp, Microsoft and, of course, Xerox.

"Then you have the problem of the software that's in the computer to read the data stored on the disks. If you want to use a network for electronic mail and send that data from an IBM Personal Computer to an Apple, you may have to reformat the data so the Apple understands it."

Depending on the differences between the computers you want to put on the network, the kinds of things Krause is talking about can be a problem. But there are some things you can do to ease the compatibility problem. For example, if all the computers use the same operating system, things will be a lot easier.

"If they're all CP/M systems," says Frank Zurcher, executive vice president of Televideo, a manufacturer of terminals and personal computers, "then there's really no problem with file formats. A CP/M file is a CP/M file. We sell a network system that uses CP/M. If you're using that operating system, you can configure it so a file server on a network looks just like another drive to all the computers on the network, and the computers don't all have to be from one manufacturer. We've con-

*To swap data on a local-area
network, you have to have several
levels of compatibility.*

nected an Osborne running CP/M into our network, and we've connected an IBM Personal Computer running CP/M-86 also." (CP/M-86 is the 16-bit variant of CP/M.)

You might think the catch in all this is the need to run the same operating system on all the machines in a network. Well, in one way, that's true; but in another way, it isn't. Suppose, for example, you had all CP/M machines with the exception of one lonely Apple off in the corner. What do you do about the Apple? Why not get a card that emulates CP/M? They're available from a number of manufacturers. While it's true that the disk format for that Apple is different from the formats of the disks on the other machines (principally in the number of tracks on the disk), that's handled by the drive electronics. The information on the disk—the files you want to transfer—is laid down according to standard CP/M conventions. Your Apple's CP/M will think the disk server on the network is another CP/M disk, and will access it accordingly. There's even a program on the system disk that comes with the Microsoft Soft Card, called APDOS, that converts Apple DOS files to Apple CP/M files. You can swap files created under Apple DOS with CP/M machines using that software utility.

Doing all this will undoubtedly require modification to CP/M on the different systems. You'll have to make sure your network vendor will provide the fixes to get everything to recognize the same hardware. Televideo's Zurcher says his company handles that for its customers.

Zurcher thinks hardware emulation, like using CP/M in Apples, will be a widely used approach to the file-swapping problem in the future. He notes, for example, that Quadram Corp., of Norcross, Ga., has a hardware emulator for the IBM Personal Computer, called the Quadlink, that lets the Personal Computer emulate an Apple II. That certainly implies

that Apples and IBM Personal Computers will be linkable over Ethernet, for example, when an Ethernet interface becomes available for the Apple.

Their name is legion

We haven't given you complete details on networks simply because there are so many and because they're all over the map in terms of the specifics of their implementation. That's likely to change in the future, as more personal-computer manufacturers jump on the Ethernet bandwagon. In fact, Apple's networking effort seems to typify the industry's frenzy in the networking area. "Our strategy," says Jay Weil, networking products manager, "is to interface to many networks. But initially, it will be Applenet and Ethernet. They have a different hardware interface, but they use the same protocols. We expect to start shipping Applenet on the Lisa the first of next year, and on the II and III two months after that. Then we will interface to the IBM network as soon as that company announces what it is."

The message here is to stick with the major computer manufacturers for computers that are to swap data. All of them will provide some way to communicate with other computers that have a significant installed base. And that communications pathway is likely to be provided by third-party vendors, like 3Com with Ethernet.

We've solved almost all your problems. You know you can swap ASCII files between computers, and that's likely to be your major requirement. So what can't you swap?

You may or may not be able to swap program files. Programs are sometimes a problem. They may be stored in source form, the language they were written in. They might be in object form, compiled into the 1s and 0s the computer understands. Some data-communications programs, like Transend II from SSM in San Jose, Calif., allow you to send Applesoft BASIC files and binary

files over a modem. But that requires swapping between Apples, because the program runs on Apples only. Otherwise, you might have difficulty. If you can convert a program file to an ASCII text file, there's no problem.

Then there are graphics files. The problem with these is their nonstandard nature. Different bits are set in the digital words that make up graphics files on certain computers. Some computers, like the Model III TRS-80 computer we started with, might interpret text as graphics, or vice versa.

There will soon be a solution. Microcom, the Boston-based data-communications vendor, has announced a new set of communications protocols that will allow any kind of file—text, graphics or programs—to be transferred between computers that incorporate the protocols, over the telephone voice network. James Dow, Microcom president, says Apple, Radio Shack and VisiCorp are among the companies which will employ these protocols in their product offerings. The local-area networks will be getting a similar solution, because many companies are adopting XNS protocols.

But in the meantime, what are you supposed to do about your graphics files? Sorry, but you'll probably have to print them out and mail them, or have the office distribution system carry them around the company, or have Chuck carry the printout over to Ralph. And what about those pesky word-processor files with the embedded control characters? The solution here is simple—take the control characters out for text transmission, put them in for printing. You could save one file for printing, with a .P suffix, and another for transmitting, with no suffix.

So the next time someone tells you you have to have data-file compatibility, and hence identical hardware for everyone, you know what the answer is: Wrong! Data files can be shared easily. ◨

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"Talk To Me"

Giving personal computers a voice is possible right now,
and the uses of it are as important as they are surprising

by Trudy E. Bell, Senior Editor

A personal computer that can read aloud to you from any written document—does that sound like something from *2001*? If so, then *2001* was yesterday—because today more than a dozen companies offer peripherals which will give that intelligence and voice to your computer.

"The applications of speech synthesis can range all the way from lifesaving to frills," states Cecil H. Coker of the acoustics research department at Bell Laboratories in Murray Hill, N.J. Already, Kurzweil Co. of Cambridge, Mass., has teamed up with Speech Plus, Inc. of Mountain View, Calif., to offer a machine which will scan any printed page and read the text aloud. Two primary uses for such a machine are as a reader for the blind or as a voice for the vocally handicapped. For business users, Speech Plus, Digital Electronics Corp., and several other companies are independently working on machines capable of sending and receiving electronic mail by voice. In industry and the armed services, speech-synthesis devices are being used as prompts for procedures, and as verbal alarm systems that alert operators to specific emergencies. And just for fun, Mattel Electronics and other toy companies are incorporating speech-synthesis chips into video games to give voices to characters and to heighten the realism of the games.

In the meantime, researchers at speech laboratories in universities (including Cornell, Carnegie-Mellon, and Massachusetts Institute of Technology) and in companies (Bell Laboratories, Texas Instruments, and many others) are engaged in a quest for ever more human-sounding speech from computers. The aim of the research is to create what Alex Waibel, research programmer in the speech group of Carnegie-Mellon University, calls "graceful interaction" between man and machine—a technology which will allow people to communicate with computers in the most comfortable, human way: natural speech.

The state of the art

Speech synthesis is the technology of making a computer speak aloud in natural language, be that language English, German, or Japanese. Speech synthesis is different from the other major area of research in computerized voice technology, speech recognition, which is the technology of getting a computer to understand what you say to it. (See the interview with Ronald Cole in the July issue of *Personal Computing*.)

There are two basic approaches to the art of getting a machine to talk. The first is *synthesis by analysis,* in which the device analyzes the input of an actual human voice speaking words, stores and processes the spoken sounds, and recreates them as needed. In some devices, the words are digitized and stored whole in the memory, as in the Mimic Speech Processor by Mimic, Inc. in Acton, Mass., and the CompuFone telephone controller board by Computalker in Santa Monica, Calif.—a technique which essentially uses the computer as a digital tape recorder. Other devices store only the data or procedure for recreating the words, as in the early and famous Speak-and-Spell by Texas Instruments.

The second approach to synthesizing speech is *synthesis by rule*, in which the device applies a complex set of linguistic rules to the input of an artificial sound, and processes the sound through a series of electronic filters to create artificial language from the ground up. The memory is filled, not with entire words, but with information about smaller units of human speech. Those units may be as large as parts of syllables or as small as phonemes, which are the most basic sounds distinguishable in the language. The linguistic rules tell the device how to recombine those units of sound to form spoken words.

There are advantages and disadvantages to both these approaches. Since speech synthesized by analysis relies on the input of the human voice, the quality of the synthesized speech can be very realistic; but the vocabulary is limited to the number

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of spoken words that can be stored in the computer's memory—typically only a few hundred. Speech synthesized by rule has no vocabulary restriction, since it can reconstruct the sound of any desired word by following the stored linguistic rules. However, the speech often sounds mechanical and can suffer in intelligibility, because so far all such devices speak with an alien pronunciation and rhythm.
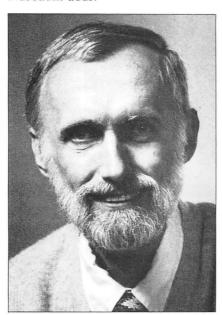
Nuts and bolts

Most of the speech-synthesis technology for the personal-computer market today is contained in hardware (although some software programs also make your computer talk). Sometimes the device is a board or a module with one or more microprocessor chips, to which you must add a power supply and speaker before plugging it into your computer. But more often it's a separate peripheral about the size of a small printer, complete with its own power supply and loudspeaker, which plugs into a computer's RS-232 port.

Speech-synthesis hardware available today ranges in price from under $300 for the Type-N-Talk device from Votrax in Troy, Mich., and the Intex-Talker from Intex Micro Systems in Birmingham, Mich., to $4800 for the Prose 2000 from Speech Plus, Inc. in Mountain View, Calif. All of these devices do essentially the same thing—take text as it is typed in at the keyboard of a personal computer, sound it out according to complex preprogrammed linguistic rules, and repeat it aloud. Depending on the preference of the user, the machine can read the text by the letter, word, line or entire file.

If all the devices do essentially the same thing, you may well ask, why the wide difference in their cost? The answer, as with any expensive piece of technology, is that cost depends on the level of performance and the complexity of the product. "There is very little question that the quality of syn-

thetic speech is directly proportional to the research and development, and thus to the cost," says Howard Nusbaum, member of a group led by David B. Pisoni at the speech research laboratory at Indiana University in Bloomington, Ind., which is studying factors in evaluating the intelligibility of synthetic speech. "You can almost index the intelligibility of the various systems by their cost," Nusbaum adds.

Dennis Klatt, of the Massachusetts Institute of Technology, developed the speech synthesis system used in DECtalk.

Indeed, the difference in quality and intelligibility between the Intex-Talker or Type-N-Talk and the Prose 2000 is dramatic. Neither the Intex-Talker nor Type-N-Talk sounds human by any stretch of the imagination. The voice is vaguely male, speaking with a strong alien accent and an even, plodding pace in a gravelly, robotic monotone. Unfamiliar words can often be confused or missed in what sounds almost like swallowing or gargling in the middle of certain syllables; you have to listen carefully to catch everything the voice says. The Prose 2000 system, on the other hand, enunciates much

more clearly, with a rhythm and inflection that is almost natural (and an accent which sounds something like a cross between Indian and Swedish)—as does a comparable new system called DECtalk under development at Digital Equipment Corporation in Maynard, Mass.

The technology is expensive because it requires both large memory and fast computing power. The basic challenge to all speech-synthesis systems is to create the most realistic-sounding speech in the most economical way. "Speech takes a lot of memory space and very high information rates if it is to be intelligible," explains Lloyd Rice, president of Computalker. "Ordinary spoken speech has a bit rate of about 8k per second. Even telephone-quality speech, which is digitally compressed, requires a bit rate of 2.5k per second. Our CompuFone telephone controller board consists of a voice digitizer and a telephone interface that works like a solid-state tape recorder and phone-answering system with editing capability, and a number of other advantages. But to use it you need a Winchester hard disk. Without a hard disk you could directly record and edit to a personal computer's memory, but at a rate of 2.5k per second, 64k of memory would be filled up in 25 seconds of speech—about 90 words!"

The tremendous amount of memory required to store whole words is the primary reason that synthesis-by-analysis systems—which are based on digitally compressed human speech—have a practical limit on their vocabulary. For this reason, much of the current research and development in speech synthesis is concentrating on synthesis-by-rule systems, which can construct speech from written text as needed by following a body of phonetic rules—much as a child learns to read familiar words by sounding them out.

A SAMPLING OF SPEECH SYNTHESIS PRODUCTS

The products listed below are a sampling of the hardware and software available that will give a voice to your personal computer. For explanations of terms such as "synthesis by rule," please refer to the text of the accompanying article.

APPLE TALKER
Softtape
5547 Satsuma Ave.
N. Hollywood, CA 91601
(213) 985-5763
Apple II, II Plus, IIe
$29.95
Software program records your voice into tables in memory and plays back as needed.

ECHO
Street Electronics
1140 Mark Ave.
Carpinteria, CA 93013
(805) 684-4593
Echo II for Apple II, $149.95
Echo GP for all personal computers with RS-232 port, $299.95
Echo II is a plug-in card complete with speaker and support software; Echo GP is a general-purpose stand-alone peripheral device.

INTEX-TALKER
Intex Micro Systems
725 S. Adams Rd.
Birmingham, MI 48011
(313) 540-7601
any personal computer with RS-232 port or 34-pin Centronics-type parallel port
$295
Stand-alone peripheral that translates text to speech by a set of English phonetic rules.

MIMIC SPEECH PROCESSOR
Mimic, Inc.
P.O. Box 921
Acton, MA 01720
(617) 263-2101
any computer with a parallel port (including Apple II, II Plus, TRS-80 Models I, II, III, North Star Horizon)
Speech digitizer that stores digitized bit stream from user's speech in computer's memory.

PC-MATE SPEECH MASTER
Tecmar, Inc.
6225 Cochran Street
Solon, OH 44139
(216) 349-0600
IBM Personal Computer
$395

Speech digitizer that uses Votrax computer-generated speech. Operates in conjunction with Speech Master Software Support Package ($95)

PC PARROT
Dragon Data Systems
1068 Homer Street, #110
Vancouver, BC, Canada V6B 4W9
(604) 255-0584
IBM Personal Computer
$39.95 incl. shipping and handling
Software program that allows user to digitize any voice signal. Can take vocabulary files and merge them into any BASIC program, for audible prompts, games, education.

PERSONAL SPEECH SYSTEM
Votrax
500 Stephenson Highway
Troy, MI 48084
(800) 521-1350
any personal computer with RS-232 serial port or Centronics-type parallel port
$395
Synthesis-by-rule speech synthesizer that will read aloud any text typed into memory, whether entered by keyboard or ASCII communication link.

PROSE 2000
Speech Plus, Inc.
461 North Bernardo Ave.
Mountain View, CA 94043
(415) 964-7023
any personal computer with RS-232 port
Prose 2000 multibus board $3500
full Prose 2020 package with board, power supply, etc. $4800
Synthesis-by-rule system that will read aloud any text entered into the synthesizer as plain ASCII text.

SOFTWARE AUTOMATIC MOUTH (SAM)
Don't Ask Computer Software
2265 Westwood Blvd.
Los Angeles, CA 90064
(213) 477-4514
Atari 400, 800, 1200, Commodore 64, $59.95
Apple II, II Plus, IIe, III, $124.95
Can be programmed to talk from either English text or phonetic alphabet (is supplied with a 10,000-word dictionary of English-to-phonetic spellings).

SOLID-STATE SPEECH SYNTHESIZER
Texas Instruments

Attn: Consumer Service
P.O. Box 53
Lubbock, TX 79408
(800) 858-4565
TI 99/4A
$99.95
Synthesis-by analysis system using linear predictive coding. Comes with a vocabulary of approximately 300 words.

SPEECH 1000
Speech Plus, Inc.
461 North Bernardo Ave.
Mountain View, CA 94043
(415) 964-7023
any personal computer with RS-232 port
Speech 1000 multibus board $1200 + vocabulary
full Speech 1020 package with board, power supply, etc., $2,500 + vocabulary
Synthesis-by-analysis system using linear predictive coding that stores digitized vocabulary from a real human voice, and can thus speak any language.

SPEECH MODULE
Commodore Business Machines
1200 Wilson Dr.
West Chester, PA 19380
(215) 431-9100
Commodore 64
Under $100!
Software cartridge plugs directly into user port of Commodore 64. Has built-in vocabulary of 235 words in a female voice.

SUPERTALKER
Mountain Computer
300 El Pueblo Road
Scotts Valley, CA 95066
(408) 438-6650
IBM Personal Computer, Supertalker II $565
Apple II, IIe, Franklin, Supertalker SD200 $199
Speech digitizer stores 120 seconds of actual human speech and reproduces it under program control.

SYBIL
Centigram Corp.
1362 Borregas Ave.
Sunnyvale, CA 94089
(408) 734-3222
IBM Personal Computer
$495
Speech synthesis board that plugs into a card slot of the IBM Personal Computer; comes with a speaker jack for any 8-ohm external speaker.

THE PARROT
Research in Speech Technology, Inc.
P.O. Box 499 Fort Hamilton Station
Brooklyn, NY 11209
(212) 259-4934
Sinclair ZX 80/81,
Timex/Sinclair T1000
$69.95
Plug-in speech module that synthesizes phoneme-based speech, although not yet from any English text typed into the computer's memory.

TYPE-N-TALK
Votrax
500 Stephenson Highway
Troy, MI 48084
(800) 521-1350
any personal computer with RS-232 port
$249
Synthesis-by-rule synthesizer that will read from any text typed into memory.

VERT 6000 (VERBAL EMULATION REAL TIME)
Telesensory Systems Inc.
455 North Bernardo Ave.
Mountain View, CA 94043
(415) 960-0920
most personal computers with RS-232 port
$5995 (plus $495 for Microvert software)
Designed specifically for the visually handicapped user.

VOICE BOX
The Alien Group
27 West 23rd Street
New York, NY 10010
(212) 741-1770
Atari 400, 800, $169
Apple II, II Plus, IIe, $215
Commodore VIC-20 $95
Speech synthesizer plugs into the serial port of a computer.

V200-VSM VOICE SYNTHESIZER MODULE
Vynet Corp.
160B Albright Way
Los Gatos, CA 95030
(408) 370-0555
Apple II, II Plus, IIe, IBM Personal Computer, PC-XT
$444
Communications product that incorporates voice synthesis in a telephone line interface device that does touch-tone dialing and decoding.

T/Maker

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is right before your eyes.
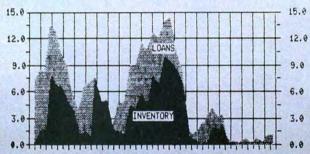
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"Synthesis-by-rule systems won't speak naturally until we've gotten the rules right."

The fact that synthesis-by-rule systems have the promise to sound out an unlimited vocabulary makes this technology highly attractive.

The linguistic challenge

There are two fundamental challenges in synthesizing speech by rule: The first is to specify the rules of pronunciation and syntax precisely enough to quantify them into parameters suitable for a machine; the second is to get the machine to produce sounds that resemble realistic speech. These two challenges go hand in hand.

The phonetic rules of the language are extremely complex. The rules in question are not rules of grammar; they are rules specifying the sounds of speech that human beings naturally make. They include rules for articulating consonants and vowels, pitch, stress, intonation (for example, distinguishing statements from questions), prosody (natural pacing and rhythm), and a host of other nuances that combine to make intelligible speech.

Most synthesis-by-rule systems start with a data base of phonemes. Each language has its own set of phonemes; in English, there are fewer than 40 phonemes. (The exact number depends on the number of vowels admissable.) For example, the word "speech" consists of four phonemes: the sibilant of the "s," the explosive pop of the "p," the long vowel of the "ee," and the harsh stop of the fricative "ch." However, synthesizing speech from phonemes alone is nothing short of "horrible," according to Ron Carlson, principal engineer of Mattel Electronics in Hawthorne, Calif. "The problem is that each phoneme can occur in various environments, and that a phoneme's actual pronunciation will depend on what surrounds it. For example, listen to the way the 'ah' sound changes when you pronounce the syllables 'pa,' 'ta,' and 'da.' In ordinary speech, the col-

oration of the vowel can actually be a stronger cue to a listener than the actual consonant. To make intelligible speech, you really need to store far more than just phonemes; you need a library of allophones, that is, variant forms of phonemes based on the context in which they occur."

But even splicing together words from allophones isn't enough, because, as Carlson explains, "in constructing words from them you need

Cecil H. Coker at Bell Laboratories is creating a model for synthetic speech by studying X-rays of the human vocal tract.

to mathematically interpolate from one allophone to the next to produce realistic speech." Dennis Klatt, senior research scientist in the department of electrical engineering and computer science at the Massachusetts Institute of Technology, and the designer of DECtalk, explains further: "In any speech system you need to have rules for changing a word's pitch if it's at the end of a question, for altering a sound's stress if it's used as an accented syllable or an unstressed prefix, for adjusting the duration of the vowels, for pausing at syntactic markers such as commas and periods, and all the rest."

Some synthesis-by-rule systems bypass the interpolation problem by storing demisyllables—halves of syllables of words—and constructing whole words from the demisyllables, or by storing transitions from one phoneme to the next. One such transition system is under development by Joseph Olive in the acoustics research department of Bell Laboratories which stores some 900 transitions from one sound to another. The reason for storing the transitions instead of whole phonemes or allophones, says Olive, is that "much of the information that the listener relies on is conveyed by the transition, so we splice the segments together in the centers of phonemes where the energy is at a steady state."

The challenge of accurate pronunciation and stress, however, is still not solved. "One of the limitations to current text-to-speech synthesizer systems is that not all the phonetic rules of the language are yet well known," states Susan Hertz, researcher in the phonetics laboratory at Cornell University in Ithaca, N.Y. "It's extremely difficult to predict intonation because intonation depends so heavily on an understanding of the meaning of a sentence—something which is currently difficult, if not impossible, for a computer to specify." Coker adds: "Synthesis-by-rule systems won't speak perfectly naturally until we've gotten all the rules right. They will speak with an accent for some time to come, because there are subtle details of language whose purpose we can describe, but not yet quantify for a machine."

How important is it to build a speech synthesizer capable of making these subtler distinctions in the language? That seems to depend on the synthesizer's ultimate application. "In general we've found that the intelligibility of the speech seems to depend most on the clarity of consonants and vowels," states Nus-

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*Intelligibility is not
easily quantified because
it depends on human perception.*

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baum. "But natural speech is very rich in phonetic cues that give redundancy and robustness to the message. Synthetic speech—even high-quality synthetic speech—requires real effort and attention on the part of the listener because the signal is stylized or even impoverished compared to human speech. The importance of naturalness in synthetic speech depends on the application. If you want to use it every day for trained personnel, then realistic-sounding speech may be less important than if the synthesizer is to serve naive listeners who may use it only once or twice."

The electronic challenge

Once the phonetic rules of the language are defined for sounding out text, those rules must be transformed into parameters that are meaningful to hardware or software. Then there is the challenge of designing the synthesizer to translate those parameters into signals that will sound like human speech.

There are several primary methods of getting a machine to synthesize human speech. One technique is called *linear predictive coding* (LPC). "Linear predictive coding uses a mathematical model of the human vocal tract," explains Dave Gilblom, an engineer who is the sales manager of Speech Plus. "The reason that you use a mathematical model to produce speech is that it requires less memory to store the instructions for operating the model to generate an electronic sound signal than it does to store the data about the signal itself.

"The vocal tract is really an acoustic tube: You can think of it as a garden hose about 10 to 12 inches long that varies in diameter—narrow at the vocal chords that inject the speech energy, wider at the pharynx in the back of the throat, narrower at the back of the tongue, wider at the mouth, and varying in diameter at the lips. The LPC model represents that tube digitally by cutting it into

10 or 12 cylindrical sections, each of the same length. Each section is characterized by a diameter. Obviously, since the vocal tract varies in diameter along its length, the model will be composed of an adjoining series of these sections of different diameters. At each place where the sections in the model join, some sound energy will be transmitted through the tube and some will be reflected back toward the source. For differences in diameters of adjacent sections of the model, it is possible to calculate reflection coefficients—that is, the fraction of energy reflected—by a mathematical analysis of a human speech signal. We then make the model talk by using the reflection coefficients to vary the diameters of the model's different sections as a function of time."

Other researchers are exploring ways of modeling the vocal tract even more accurately. At Bell Laboratories, Coker is working on a model based on X-rays of the human vocal tract to compute sounds produced by "motions in the lump of flesh that shapes the cavity in the mouth." Instead of making a model based only on energy reflected from junctures in a series of cylinders, Coker has been trying to produce speech by designing programs that mimic human voicing, lung air pressure, tongue position, jaw opening, lip extension and rounding, nasal coupling, and the smooth movements of the vocal tract in the transition from one sound to another.

A very different technique for synthesizing realistic human speech is called *formant synthesis*. "Formants are natural resonances in the human vocal tract," explains Klatt, developer of the vocal tract model used in the Prose 2000 and also in the DECtalk speech-synthesis system.

The principle behind formants is similar to the principle behind the way music is produced from a wind instrument. Each note played

vibrates at a certain fundamental frequency, with harmonic vibrations at higher frequencies corresponding to multiples of the fundamental frequency. The fundamental is the lowest-pitched sound of that note and the one that identifies it as a certain note; the harmonics serve mostly to add richness and color to the sound. The amplitude of each harmonic is determined by the formants, or resonances, in that instrument. It's the formant structure of the instrument that allows a listener to identify the musical instrument producing it as a trumpet instead of a tuba.

Formants operate similarly in human speech. "There are five or six formants, or resonances, in the vocal tract," explains Robert Brennan, colleague of Ronald Cole in the speech laboratory of Carnegie-Mellon University. "The way in which the first three formants (the three lowest-frequency formants) vary in relation to each other tells a listener what the sound is—which vowel, which consonant. All the others don't tell you much about what's being said—just who's saying it. Usually you can find the first three formants at sound frequencies below 3500 hertz (cycles per second). The voice of a woman or child will have higher-frequency formants than the voice of an adult male, but the *relation* between the formants for each sound will be the same." Depending on the formant synthesis system, the computer produces sound by synthesizing between three and five of the lower-frequency formants.

Three speech categories

Speech synthesis is a new and dynamic technology. The devices and software on the marketplace today seem to fall into three categories: relatively inexpensive synthesis-by-analysis systems which speak very well but with limited vocabulary, relatively inexpensive synthesis-by-rule systems with unlimited vocabulary but marginal intelligibility, and very

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over the phone any message
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expensive synthesis-by-rule systems that have unlimited vocabulary and good intelligibility. "Until the next level in integration of semiconductor devices occurs, the systems will remain complex and relatively expensive," observes Gilblom.

As Nusbaum has pointed out, intelligibility to strangers isn't always a major drawback. "Training listeners through constant exposure and practice helps a great deal. Eileen Schwab here at the speech research lab at Indiana University has shown that naive subjects tested for word recognition of nonsense sentences from an inexpensive synthesizer get about 25 percent of the words right. Yet after 10 days practice with the synthesizer, they improve their performance to 80 percent. That suggests that in a task such as database entry and retrieval in which the synthesizer would be used by experienced personnel, a low-cost synthesizer might be a good choice."

In some applications, however, intelligibility is crucial. "We've done some work for the Air Force, which wants to put synthetic speech warning devices in the cockpits of planes. One potential concern is that someone working on a task may miss the content of a spoken message," comments Nusbaum. "And if the message is sufficiently unintelligible so that the pilot starts paying attention to the talking instead of to the enemy in an air battle, he's in big trouble."

The problem of divided attention can make interpreting synthetic speech a tiring effort. "Speech is normally a function interpreted by a specialized area of the left hemisphere of the brain, called Broca's center," explains Carlson. "If speech begins to get unintelligible, the brain starts dividing its attention between parsing the speech and figuring out what it heard—which emerges as a competing task. If the speech gets too unintelligible, the right hemisphere of the brain takes over and starts to interpret what it hears almost as

music, responding to the pattern and the rhythm of the sound instead of to its content. Some speech systems are so unintelligible that an innocent listener isn't even sure it's speech. And it doesn't take very many competing tasks before the intelligibility becomes unacceptable."

Of course, the question of intelligibility is highly subjective. What may be fairly intelligible to one person may sound almost like gibberish to another, because intelligibility depends in part on human perception. This subjective factor makes it very difficult to directly compare similar speech-synthesis systems and arrive at a ranking based on intelligibility. "Actually, there are no well-established procedures for assessing the performance of *either* speech synthesis or speech recognition systems," says David Pallett of the Institute for Computer Sciences and Technology at the National Bureau of Standards in Washington, D.C. "In reality, it is a complicated task to try to go from having a product that works to having a set of meaningful standards that state how well it works—and for what application."

Nusbaum disagrees. "People's preference as to whether they like one synthesizer over another may be individual. However, through our perceptual tests we've found that their rank ordering of the intelligibility of various speech systems is highly consistent." Carlson adds: "You *can* measure intelligibility—and you must measure it, because no one will be successful in the market until you *do* measure it."

The promise of talking computers

A number of the researchers are eagerly anticipating practical uses for high-quality, synthesis-by-rule systems that will be able to make your personal computer read aloud from any text. "There are at least three uses for speech synthesis in the professional environment," claims Gilblom of Speech Plus. "The first is

in any office that requires the proofreading of documents. Proofreading is a lot more accurate when the text comes in to a proofreader in voice form as well as visual form. That's why publications and photo-typesetting houses employ proofreaders in pairs: One person reads aloud to the other. Here at Speech Plus we're working on interfacing the Prose 2000 to word-processing and typesetting systems to allow the computer to be the second person. With text-to-speech systems that can read aloud from any document, we can automate the proofreading process.

"The second important application of speech synthesis is in teaching," Gilblom continues. "If you want to teach new operators how to run a program or a specific personal computer, you can do that three ways: You can send them to a class, which works pretty well; you can give them the manuals and tell them to learn on their own, which is abysmally slow and inaccurate; or you can give them an audiocassette, which is between the two in accuracy. The problem with either the manuals or the audiocassette is that the student gets no feedback when he's made a mistake and needs it the most. It doesn't solve the problem to fill up the machine with HELP screens because they interrupt the display he's trying to learn. But if the machine can talk, it can explain the problem without interrupting the display: 'We direct your attention to the cursor in the upper left corner,' etc."

"The third important professional use of speech synthesis is the remote access of data. With speech synthesis you can have access to your electronic mail over the telephone. If you have a personal computer that can read aloud to you anything it has received in its memory, you can collect your electronic mail even when you're traveling by using the touchtone pad of a pay telephone as a data-input device. This would be useful for auto-

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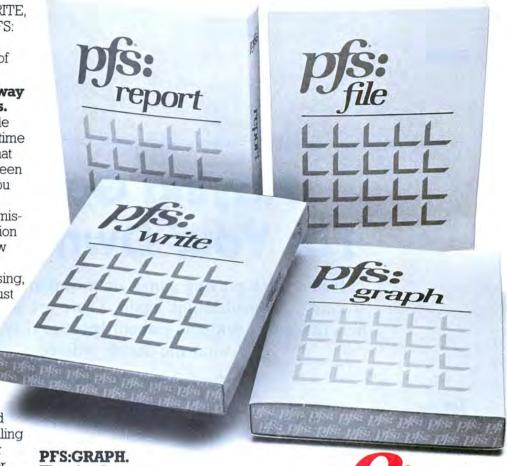
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Playing Games For Your Own Good

If you think playing games on a computer is just for kids, you should think again. There are some hidden benefits you should know about because they may be just what the doctor ordered

by Craig Zarley, Associate Editor

"Whenever I'm a little lethargic and should be doing some work on the computers, I play Gorgon to get my blood running."

That statement comes from a young business executive who owns an Apple II and a Commodore 64. His computers are his livelihood and he's serious about his work. But he's joined the growing number of people who have discovered that playing computer games can be quite different from the zip, bam, pow of comic-books-come to-life in the video arcade.

With more memory to work with in home computers than in video game machines, designers have created games with complex graphics and challenging scenarios. As a result, games are working their way out of the arcades and into the home where serious computer users now spend hours blowing up aliens and saving mankind from destruction.

Are we children at heart wasting time with all of this game playing? The experts don't think so. Educators and psychologists tell us game playing helps develop logic and problem solving abilities with real world applications. And well-designed teaching games help children learn faster, by capturing their attention and making them interact with the computer. A story in the April issue of *Personal Computing,* "What's in a Game," explored the many benefits to playing

computer games. And another in the June issue, "A Buyer's Guide to Fantasy/Adventure Games," showed you what's new in the fantasy/adventure genre of the game market.

But one big question remains: Why do people play computer games? Is it escapism or a conscious leap into another reality? Do we play because we love to compete or because we're frustrated? Not easy questions to answer. The reasons people play may be as varied as the personalities of the gamesmen themselves.

Enlightened pupils

You're in a log house surrounded by rugged mountains. The house has no electricity. Outside, there are wild boars, deer, and rattlesnakes. A trout-filled stream flows nearby. There are no other people around now, but occasionally you have to chase away poachers with your .30-.30 rifle.

What sounds like the introduction to an adventure game actually describes the home of Dr. John Moore, professor of psychology at San Jose State University, who researches why people play computer games.

I talk with him in a windowless cubicle in the basement of the university's psychology building, 25 miles north of his home in the Santa Cruz Mountains. We're alone in the room, and we may be the only ones in the building, now deserted because of

summer vacation. So secret are Moore's games studies that he's forbidden to publish the data. He refuses to tell me who financed the research. But it's a safe bet the money came from Silicon Valley a few miles away, where fortunes are won and lost not so much on why people play computer games, but if they play them at all.

Moore has curly hair, a mustache and resembles someone you might bump elbows with in a video arcade. "Computer games are a healthy escape," he says. "We are basically all interactive individuals, and computer games are interactive recreation as opposed to sitting in front of a television and becoming goo-goo-eyed."

What he has discovered in his research is what many gamesmen have known all along—people are attracted to computer games because they are both stimulating and relaxing. Moore studied males age 10 to 35 in a neutral environment—one devoid of extraneous arcade lights and sounds—a place most like what you might find at home. He let his subjects play two games; one a known commercial success, the other a known failure. Neither Moore nor the gamesmen knew which game had been determined by sales figures to be the more stimulating.

While they played the games, Moore measured their heart rate and pupil size.

*Computer games
are a leap into
another reality.*

ONE

PINBALL CONSTRUCTION SET
lets players use a joystick
controlled hand to "group"
pictures of game parts and
drag them onto the playing
board where they will function
like their real-life counterparts.
The Lisa-like icons in the column
on the right give the player
access to different game
building powers.

TWO
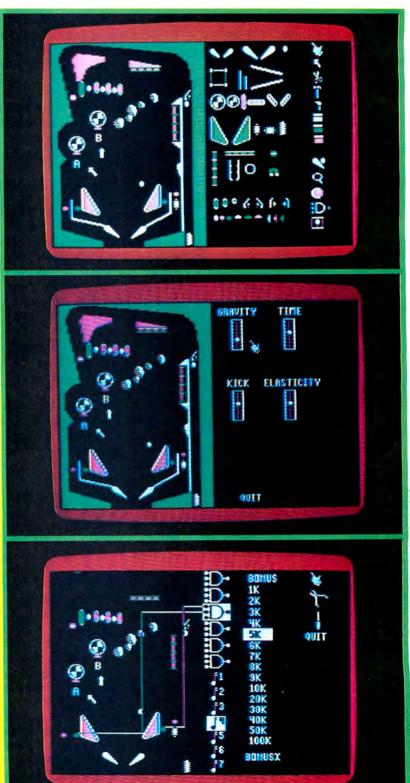
THE PLAYER
has activated the world icon
causing the parts box to be
replaced by gauges for gravity,
speed, etc. Using the hand to
move the gauge markers up
and down decreases and
increases those forces.

THREE

THE PLAYER
has activated the AND gate
icon causing the targets that
produce sounds and scores to
be highlighted. Sound and
score values for each target
can be changed and targets
can be wired together (using
the joystick-controlled
screwdriver and pliers) to
create bonuses.

Photos courtesy of Electronic Arts, the publisher of Pinball Construction Set by Bill Budge

"Pupil size telegraphs the attractiveness of the game," Moore recounts. "When pupils dilate, that indicates arousal, which in this case translates to a greater interest and interaction with the game. The players' pupils really dilated to the game that was a money maker and didn't to the one that was a loser." Surprisingly, the heart rate of the players didn't increase with either game. Moore interprets this to mean computer games stimulate the mind and relax the body.

But the "why's" of computer game playing can't be unmasked with EKG machines and pupilometers. So Moore simply asked the subjects why they played, and what it felt like.

Beating the machine

"The competitive aspect of game playing came up most often," says Moore. "We are in a competitive society, and the most common response was that playing a computer game felt like competing in sports. Even people who claimed they weren't competitive said they wanted to do anything possible to beat the machine once the game began."

Moore views this as a healthy outlet for aggressive behavior, even when the computer game involves violent activity like blowing up objects or shooting villains. "When we tested people during finals week, they all said they felt relaxed as opposed to aggressive after playing a computer game. Contrast this with the aggressive feelings some people harbor after watching football."

There are some gamesmen, however, who don't like to describe their game playing using terms like "blowing off steam" or "escapism." Mike Coffey, vice president of Bruce & James Program Publishers, Inc. in San Francisco, likes to refer to his game playing not as an escape, but as "a reach into another world."

Coffey, who spends his days writing software for the IBM Personal Computer and Commodore 64,

often spends his nights playing games on his Apple II and Commodore 64. His game playing is not only competition, but a way to amplify or alter his moods. He talks of computer games the way some of us describe our favorite music. When asked why he plays, he answers simply, "to change my attitude."

"Whenever I want to psych myself up, I play Sirius Software's Gorgon," he says as he boots the game into his Apple II. (To me not being an avid game player, Gorgon looks like fairly standard arcade stock—the player manipulates a figure to shoot down aliens.) "I haven't played this for a while," he confesses as he moves effortlessly through the first level, "but it's like riding a bicycle . . . ooh. Shot my own man."

As the game speeds up, I realize Gorgon is more than a simple reflex game. Some things you have to shoot, some you have to protect, and some you avoid.

"You learn quite a bit about your own psychology by playing games," Coffey notes. "Game playing takes you into your subconscious. It took me forever to learn how to survive for more than a minute, but now I can play almost indefinitely—even when I'm carrying on a conversation."

When asked the "why" of game playing, Coffey discourses on which qualities of a computer game are most attractive to him: First he looks at the game's design. An avowed animation fan, he says the game must have quality graphics. Then he refers to something he calls playfulness. "It's very subjective, but it really makes a difference in the game's quality," he explains. "Quite often, it could be a sense of humor, or just something funny to take away from any violence or ugliness in a game."

To give me an example of what he means, Coffey removes Gorgon and inserts Synergistic Software's Nightmare Gallery. "When I want to get fired up I play Gorgon," he explains. "When I just want to stare at the

screen, I play Nightmare Gallery."

A graveyard appears on the screen with jack-o'-lanterns *floating* between the tombstones. Instead of a spaceship, your weapon is a revolver. As he guns down the pumpkins they turn into tombstones, which in turn provide cover for the various monsters that subsequently appear on the screen. Mummies that come at you can't be killed with the gun, and you have to run away. Assorted monsters steal bodies from their graves and fling them in your direction. A banshee howls when you succumb to one of the many hazards. "I like this game," Coffey says, "because with everything going on, the screen seems actually haunted."

A cure for pinball

Coffey is really on a roll now. Like someone playing his new records for a friend, he removes Nightmare Gallery and fires up Raster Blaster by Budgeco, the first game designed to lure pinball addicts to computers. Now eclipsed by more complex computer pinball games like Electronic Arts' Pinball Construction Set and Broderbund's David's Midnight Magic, Raster Blaster lets you double flip and even catch the pinball with a bent flipper.

"This is maybe a two-in-the-morning game for me," Coffey says as he shoots the ball up a side chute and through a revolving gate which continues to spin after the ball has passed. "I'm pretty competitive, and I want to get a high score when I play Raster Blaster. It's a concentration game that I play when my mind is active but my body wants to relax."

Coffey is a keep-the-ball-in-play pinballer. The computer ball careens across the screen even as we speak. I ask him if he ever plays adventure games, ones in which the player moves through an intellectual maze of fantasy situations.

"I've been following adventure games, but I can't figure out why I don't play. I think that for a long time

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CIRCLE 41

"I play computer games to improve my concentration. "

HOME

the graphics weren't very good. And in some games, learning the language for commands to move you from situation to situation was like learning Pascal. Adventure games are getting graphically better, however, and I'm searching around for one that will stimulate me."

To Coffey, graphics are so crucial that they even influence his choice of computers. At Christmas time last year, a friend asked him which computer to buy to play games on. He suggested the Atari 400 computer because of the amount of games software written for it. But Coffey relates, " My friend said, 'I don't want a computer. I just want to play games.' "

He bought the Atari 2600 video game machine instead.

"There is a threshold of graphics quality and motion the games player should demand," Coffey explains. "The 2600 is on the wrong side of that threshold."

Coffey's next disk incorporates the qualities most dear to him—great graphics and playfulness. Broderbund's Choplifter is a thinly disguised version of the failed Iranian hostage rescue mission. You guide a helicopter over desert terrain as tanks shoot at you from below, your mission is to rescue 64 people and transport them safely to a post office flying the American flag.

The helicopter tilts forward as Coffey flies it across his computer screen. As the helicopter crosses a fence trailing into the horizon, the screen seems to take on a 3-D effect. I look at the stars and the moon in the background, but Coffey draws my attention to the people.

"The key for me in this game is the little men on the screen. When they run to the helicopter, their stride is different than when they run away from it after you drop them off. And they wave one way when you set the chopper down to pick them up, and a different way when you leave them at the post office."

He likes this game because it has a well-defined beginning, or mission, and an end. Transport the 64 people back to the post office and the game is over. It may take you a long time to finally beat the machine and win the game, but at least the game offers such a scenario.

"I play computer games because they improve my concentration," Coffey says. "Because of that, they may even be responsible for building intellect. You are rewarded for paying attention to detail and penalized for heedlessness. Beyond that, they're super for working out frustration, if that's what you need to do. What could be a better authority figure to beat than a computer? When it says you're dead, you're dead, and you can't argue. But you can fight harder the next time."

Almost real games

On a hot summer afternoon in a suburban San Jose, Calif., neighborhood, Paul Cozens is once again fighting the battle of the Coral Sea. Cozens is the president of Jagdstaffel Software, a small company he operates from an office in his house.

He excuses himself for a minute while he types instructions into his Apple II. He watches the computer's screen intensely. On a writing board above his desk I see "Coral Sea, May 9-10, 1942, weather a factor." I wait patiently for him to return from the Pacific battle.

In a few minutes he looks up and explains that he's writing a computer simulation of the Coral Sea naval battle with the Japanese. He has already written TSKFRC 58, a computer game for the Apple II which reenacts the 1944 Battle of the Philippine Sea.

"I play computer games because they're relaxing, challenging, and a total break from the real world," says Cozens, who is a former Navy pilot and Army intelligence officer. "I like games that are as close to reality as possible.To me, arcade-type games

are boring. All you do is run, jump, or shoot something. There's no thinking involved."

The games Cozens plays are best described as war strategy games in which you compete against another person in a one-on-one situation. The best and oldest example of such a game is chess. In Cozen's computer combat, however, the players relive actual battles. And, in contrast to arcade game scenarios, he says the action comes in planning battle strategy, not shooting the enemy.

"When the fighting starts in a war game, your fate is pretty well sealed. If you've planned well, you'll usually come out on top," he explains. "That's the way real battles unfold."

And reality is what Cozens tries to achieve. He jumps from the Coral to the Philippine Sea by inserting TSKFRC 58 into his Apple II. It's 1944 and Guam and Saipan are still in the hands of the Japanese. The American objective is to capture the island group for B-29 bomber bases. The Japanese goal is to defend the islands and destroy the American naval task force.

As he prepares to fight what some call the "Great Marianas Turkey Shoot," he launches into a monologue only an airplane historian could appreciate. In writing the game he has factored in the air speed, fuel capacity, and firepower of every plane involved in the battle. He calls planes by their nicknames—Zekes, Jacks, Bettys, Hellcats. He's even figured in the relative skill level of each pilot, explaining that the Japanese are at a disadvantage because they lost their best men in an earlier battle.

But this is all behind-the-scenes work. When the gamesman plays TSKFRC 58, all he sees is a list of his battle groups with random skill ratings from one to 10, with a higher number indicating a more formidable fighting unit. A grid map on the screen shows the islands and the locations of his task forces. The enemy ships are invisible. Players take turns,

and each must leave the room when the other makes a move.

Subs can ruin your day

Cozens shows me a speeded-up version of the game. (Full-fledged combat can take up to six hours.) He moves his aircraft carriers by entering bearings into the computer. He arms and launches planes for both combat and reconnaissance, the goal being to locate and attack the enemy before he finds you.

"When you're sending out planes," he explains, "you really have to be conscious of fuel capacity. Each turn burns off a certain amount, but the fuel consumption triples when you're involved in combat and you can run out in a hurry. If you get excited and forget about fuel, your planes run dry and crash."

Another hazard is the random placement of subs. While other ships can move about, submarines remain stationary. You know where yours are, but not the enemy's.

"Running into a submarine can ruin your whole day," says Cozens, who has just launched an attack on Guam.

When combat begins, the screen switches from a grid map to a written account of the action, which flashes across the screen.

Cozens watches intently and reports his status: "The anti-aircraft fire is tapering off as we wear down the island defenses," he notes calmly, but his tone changes abruptly. "We took a hit on the aircraft carrier Enterprise! Secondary explosions! That hurts. If I had had an air patrol up, this wouldn't have happened."

The situation turns grim. "They're blowing my destroyers out of the water," he says with resignation. "Oh no; the Japanese naval bombers have found us."

The screen announces, "Aircraft carrier Yorktown hit! Secondary explosions!"

Cozens has seen enough. He abandons the game to address my next question—Isn't it a little weird for grown men to become so engrossed with a computer war game?

"Not at all," he responds quickly. "It's very stimulating, yet relaxing. It's a complete break from reality. Thrill without risk. We all should play computer games and not fight war any more. Just think how many lives and how much money would have been saved if the Argentinians and British had fought the Falklands War on a computer."

For love and . . .

Tom McWilliams, Jr. is 18 years old and a recent high school graduate. In his room at his parents home in Orinda, Calif. he keeps an Apple II Plus, a Commodore VIC 20, and other electronic paraphernalia such as a video recorder with a 10-square-foot screen, a stereo with two four-foot high speakers, and a digital music synthesizer. On his wall are two posters of a sleek red Lamborghini sports car.

He designed the computer game Outpost for Sirius Software, and has written conversions so that Atari Home Video games can be played on Atari computers.

"Have you made enough money to buy a Lamborghini?" I ask.

"No way," he laughs. "But I did make enough to buy a red Porsche 944. I set that as a goal to achieve before graduating from high school."

McWilliams is preparing to move to Los Gatos in Silicon Valley where he will work for Imagic, a computer-games company. He considered attending college, but after sitting in on a few courses at MIT, decided against it.

"Technology advances too fast for the professors to keep up with it, and I didn't want to be left behind," he explains.

His favorite game computer is the Apple, because with more memory than game playing machines, he can design better graphics. "You have to design a lot of color graphics into the games or people won't play them," he says. "People don't have time to try them out at computer stores, so they usually buy the one with the best looking graphics."

As to why he plays games, McWilliams has to think a while before answering. "It's a great challenge," he says, finally. "The computer gives a totally new aspect to video—you not only watch, but are a part of the graphics."
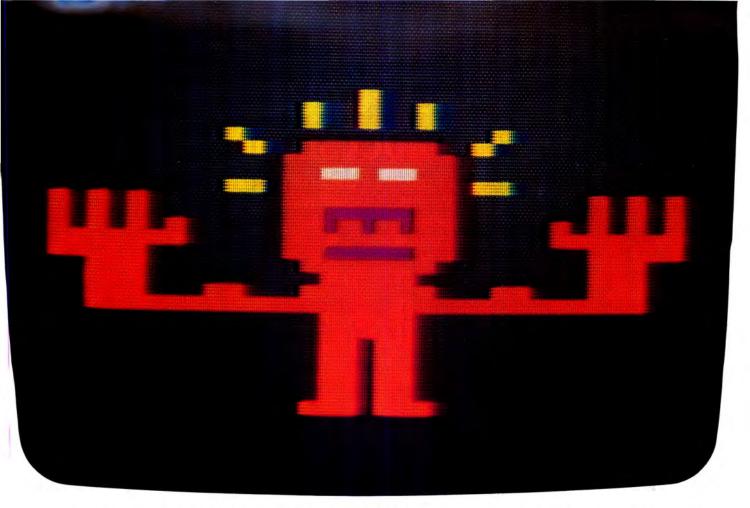
His favorite games are those which are fairly simple at first, but become progressively more difficult.

His own game, Outpost, has that feel to it. He seems self-conscious playing it in front of me. "Basically, it's just a simple reflex game—easy to play, but it takes a certain amount of hand-eye coordination."

The game features a stationary space station with a single gun portal on each of the four sides. Initially, the station is vulnerable to enemy spaceship fire only through the four portals. Shots to the side of the ship are deflected. But as the game progresses, a satellite spins around the station, firing randomly, each shot removing chunks from the outpost. You have to time your fire to shoot the satellite as it orbits past one of the gun posts. "The best games are ones that involve an element of curiosity—you want to stay around long enough to see what's going to happen at the next level," he says. "And I'm fond of ones that are slightly unfair—ones that get you in some way that you can't help. Those games make you want to come back to figure out how to avoid the situation."

And maybe in the final analysis, that's what makes computer games so much fun to play—we are all curious beings who want to stick around long enough to see what happens next. As in life, the forces we succumb to don't often play fair. But with the computer, you always get a chance to settle the score.

Why play computer games? The answer is: Why not? **⚉**

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Mine, Yours, Ours

Mine: The product I create
Yours: The product of my employees
Ours: The product of our combined effort

by Arielle Emmett, Associate Editor

"To find a form of association which may defend and protect with the whole force of the community the person and property of every associate, and by means of which, coalescing with all, may nevertheless obey only himself, and remain as free as before."

Jean Jacques Rousseau
Contrat Social (Social Contract)
1762

There is a new set of social contracts that has to be worked out in the corporation these days: Managers must determine, as the French utopian philosopher Rousseau once did, how to divide up territories, maintain the integrity of the individual, work superbly for the common good, and cope with the coming forces of Revolution. This is by no means an easy task, especially since the Revolution—if it does come—will manifest itself in the form of ideas; not necessarily corporate or "collective" ideas, but ideas generated by single human minds, informed, some of them, by highly individualistic values, and aided by tools that help communicate, refine, and even magnify those ideas into palpable and precise forms and products.

One of these tools is the personal computer. In its infancy still, but precocious beyond expectation, it has proven itself to you, the manager, as a productivity tool.
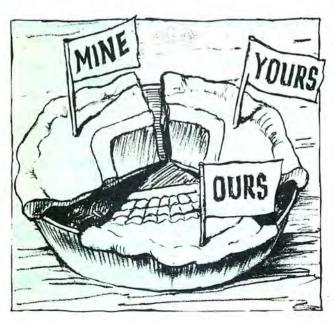
But computers are also a new form of property—not just physical property, but intensely individual, intellectual property. Within the context of the corporation, property produced by the individual, shared with peers, but ultimately used for corporate ends becomes subject to a new set of social relationships, even a struggle between what is "mine," "yours," and "ours." The struggle is based on the frankly possessive feelings that we as

individuals, as teams, and as corporate entities now harbor as a result of putting our minds—enhanced by computing tools—on the line.

When I say, for example, that some idea or product I've labored over is mine, it becomes more intensely "mine" because I have created it with my mind, and with tools to aid my mind, rather than acquiring it by usurpation, violence, or even by gift or legacy. That which I create, then, becomes a gift to myself. When I extend that gift to someone else—i.e., when I elect to share or communicate my ideas, or the data from which my ideas are drawn—through a local computing network, for instance—I am entering an agreement that these ideas will not only be mine but "yours" also. As a manager, then, I'm making a decision to support your productivity; I'm entering a pact implying mutual giving and respect—an "I and thou" in computing which many of us identify as peer-to-peer communication. During this process you may take my idea, modify it, or implement it in different ways until the idea becomes uniquely yours and mine. Finally, since we are working in the context of a larger corporate body, all ideas and

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products generated become part of a big "ours"—"our computers," "our computing," "our ideas." In such an environment, computing is never one *thing*, nor is it one possessive pronoun. It is, or should be, shared territory—mine, yours, and ours.

Proprietary computing

Successful managers must mediate between these territories, but first they must recognize that as computing accelerates the production of ideas, even the quality of alternative ideas, so it also may stir feelings about how those ideas ought to be rightly used and implemented. In short, computing, as an act of thinking, may stir feelings of autonomy. We, as individuals, as peers, even as corporate groups, feel proprietary about that which we produce. Proprietary feelings may drive us toward a new sense of integrity about our work, and will become more intense within the Corporate State. We are already beginning to see it in the energies with which many junior executives are seizing the tool as a new personal domain that gives them leverage, efficiency and ultimately, a greater sense of personal achievement; the increasing practice of "after-hours" experimentation, of requests to take the computer home; of young managers distinguishing themselves by programs and ideas they have worked out in isolation, within the territory of the "mine," or in concert with each other—the "I and thou" computing relationship.

We should not make too much of this, but neither should we take it for granted. One of the dangers evident already is that managers, corporations, even individuals, are trying to make of computing one thing: to garner the achievements of this new territory to exploit or to hold power over another. In short, computing has not really improved the way we, as people, treat each other. All too often this is made manifest in a corporate environment in which the "mine" and

"yours" of creativity, of thinking—even the rights to think and act in ways that would do the job better, are stimulating to oneself, to one's peers and subordinates, and productive for the company as a whole—are too easily subsumed to a perceived greater "corporate interest"—the "ours." I say perceived interest because we as individuals act in that corporate interest, and perceive ourselves as instruments of that interest all too readily, without considering, really, what our emotions tell us about more neglected personal territories—cognitive territories, territories of freedom.

No longer cogs in a wheel

I am saying now that managers can no longer neglect these territories. They are expanding, and as they do, the equations of power in a corporation must necessarily change, as do the implied Social Contracts governing the ways in which we work. Already, without a treatise as such, but as a direct result of new computing and telecommunications technologies that once again hold out a promise of personal recovery and exploration as well as increased productivity, workers are demanding more from what they do. No longer cogs in a wheel—or, at the very least, resistant to the wheel—they are made and measured by the quantity and quality of their ideas. As the demand for effective ideas increases, so, necessarily, will the demand for the freedom to produce them. Of necessity, workers who are increasingly relied upon to produce ideas, rather than to perform material functions, will make greater emotional investments in their work. It is also likely they will be more concerned about how the products of their minds are used in the corporate territory, even the world marketplace. It follows, then, that individual workers will become more visible, more vocal; hopefully, they will demand more of themselves—and of

you, and of the corporation. In short: The new Social Contracts will demand greater accountability of everyone.

In this light, you, the manager, may be forced to give up a certain hoped-for transparency, and to look harder at yourself, your productivity, and the ways in which you attempt to boost the productivity of your workers. If, for example, you have blundered into a kind of "institutional," or "ours" approach to personal-computing tools, if you have tried to restrict or control their use along old-style electronic data-processing lines, skipping over "mine" and "yours" directly to "ours"—whether that be to configure people to rows of identical computers doing repetitive or highly proscribed tasks, or to force them to stare at a CRT screen eight hours a day and expect them to like it, even to perform data-processing miracles—you may need, sorely, some re-education. To start with the collective premise in personal computing, or in any real cognitive function, is to miss the point, and goes against all the power—and all the intimacy—these productivity tools were designed for.

This brings me to Rousseau.

At the time he was writing, indeed, at the time he was grappling with the same questions of freedom, productivity, and territoriality we struggle with today, there was enough outrage in the world, among states and among men and women, to propel several revolutions. These came to pass in France and in America, and most important, in the minds of thinking people. Rousseau articulated their outrage when he tied the productivity issue to issues of happiness, of balanced social relations between the individual and larger governing groups making up the productive body of Society. Why, he asked, did men and women, born free, so easily, in his own words, "alienate" their rights to these groups, even to kings and despots

"Computing, as an act of thinking, may stir feelings of autonomy. "

who offered so little in return?

"To alienate," he wrote, "is to give or sell. Now a man who becomes another's slave does not give himself; he sells himself at the very least for his subsistence. But why does a nation sell itself? ...Do subjects...give up their persons on condition that their property also shall be taken? I do not see what is left for them to keep."

Rousseau's genius is that he went further than that. He proposed a model of a State—very much like a Corporate State we see today—in which people who willingly associated within it, by Social Pact, gained more than they lost. Individuals, he argued—agreeing to associate with each other to form a common body, a State, in which sovereignty ultimately rests with the people and cannot be delegated to representatives or modified by contract to a king—sacrificed certain natural liberties, "an unlimited right to anything which tempts him and which he is able to attain," for another kind of freedom: Civil freedom, and the rights to property gained not by might or encroachment, but by staking claim to as yet unoccupied territory. This, in Rousseau's eyes, was the superior choice, and made for the most productive men whose claims to property were made "...not by an empty ceremony, but by labor and cultivation, the only mark of ownership which, in default of legal title, ought to be respected by others." Only then, he argued, could "what is mine" be distinguished from "what is yours" and "ours" collectively.

Productivity relationships

In the Corporate State today, especially in America, territories have almost run dry. We have not chosen to see what astute observations about our own experience Rousseau might offer us. We do not understand his productivity equation, even as we hunger for solutions to our perceived "productivity problem," and even as

we turn toward personal computing as one of the few effective solutions available to us.

The Japanese, on the other hand, so readily understand him, or at least the very subtle modulation of "mine," "yours," and "ours" he spoke of implicitly in his work, and in all productive relationships, that they have successfully achieved Corporate States which somehow manage to retain a measure of personability, if not humanity; to include workers in the Larger Plan; to involve them; to make individuals feel that their efforts—enlarged efforts, the best efforts possible—are indeed worth it. Those are the mutual pacts of respect—respect for "mine," "yours," and "ours," from which great productivity relationships are made.

Of course, the Japanese didn't need to read Rousseau to know this; they have centuries of practiced social relationships to draw upon. Having thought hard over time about how to manage people in shrinking territories, having acknowledged that there is a way to respect differences between people, both seniors and neophytes, they've made sure that their corporate bodies do not much depart from Rousseau's imagined Ideal, as organic things existing not only for the benefit of themselves but for the benefit of the individuals who contract to work within them, gaining some measure of freedom, dignity and productivity in the bargain.

I am not saying we can draw, literally, from either the Japanese or from an 18th century French philosopher whose tract, admittedly, was utopian and designed for a world in which the words "personal computer" and "telecommunications" did not exist. At the same time, we can't turn our backs on them with the certainty they have nothing to teach us. They *do* have something to teach us, just as our own Industrial Revolution metaphors—metaphors of machine, of assembly line, of "gizmos," and of monolithic Corporate States which

seek, above all else, to perpetuate themselves, even as they diminish the contributions of workers by *claiming* them dispensable—have worn out. And we would do well to think about what should replace them.

The effects of confusion

In the computing world of this moment, we are seeing the effects of our confusion and inertia. At one end of the spectrum, computing experts I've spoken with point to a "chaos" in implementing personal-computing systems within corporate states large and small. They say that some companies, especially the smaller ones, are sliding into a posture of "buy whatever you want" such that workers are accumulating and experimenting with personal computers, peripherals, and software at a rate—and with a certain imaginative wildness—which results in personal productivity gains but poor networking capability. Here, the newfound freedom, the idea of computing as "mine," "mine," and "all mine," seems to rule; the result is a forest of incompatible equipment. But this problem is not insoluble, really, since greater networking capability, including file-transfer programs and the convenience of electronic modeming, is already making it easier for computers to "talk" to each other. We know this talk to be all for the good, but the cost of translating many kinds of "talk" suggests we didn't quite grasp the productivity issues—mine, yours, and ours—in the first place. We opted instead for as many wing-ding gizmos and doodads as possible—the get-rich-quick manufacturer's dream, but a genuine headache for the average computing consumer. Now it is incumbent on the industry, and managers, to electronically unsnag the mess we've made, and to standardize certain interface devices, such as the computer keyboard, in order to make the personal computer easier to use for everyone. A shakedown, analysts say, is

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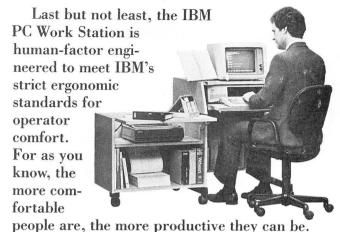
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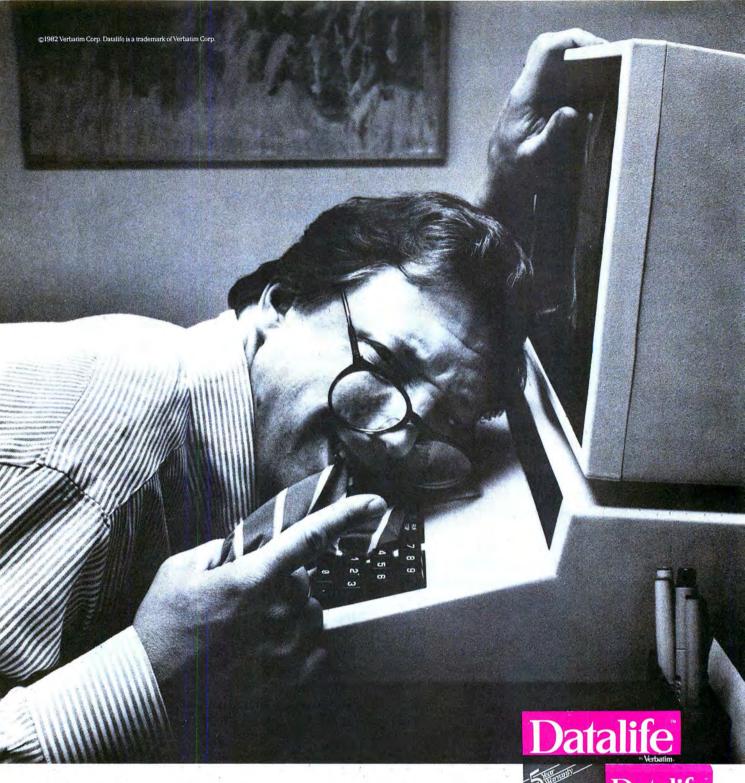
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coming, and with it, our so-called "incompatibility problem" will of necessity be solved. It is the least of our worries.

At the other end of the spectrum there are those who speak of an "orderly evolution" in computing. These men, optimists from corporations producing personal computers, point to the rapid change of the device from "stand-alone" to a distributive processing tool, e.g., a passive terminal tied by network to a mainframe, and subject to its control, evolving still further into a "peer-to-peer" communications device now capable of being adapted to teamwork, file transfer, individual use as well as collective use. The personal computer, in short, is triumphing by virtue of its flexibility and willingness to be whatever we want it to be. There is no gloom and doom foreseen here; everything will be fine.

Unforseen pitfalls

Yet there are other voices expressing doubts. They point to the rapid depersonalization of "personal" computing: of corporations immediately reducing it to its most automated, least creative functions; of an "institutional" computing style which boils down to "buy the hardware first," "don't worry about the lighting" (or the software), "expect your people to sit in front of the CRT screen eight hours a day" (and love it), equate efficiency with effectiveness (they are not the same), and brag how you, the manager, have overseen the smooth introduction of a "personal" computer system into your corporate environment—"which promises," you tell your superior, "to greatly boost *our* efficiency." No matter that your employees can't stand you. Or that your neglect of certain ergonomic details has resulted in blinding, fluorescent-light "railroad tracks" across the rows of CRT screens you've ordered. Or that you have committed the even graver mistake of forgetting why you wanted

personal computers in the office to begin with: not just to process data, but to give your thinking employees some new leverage to process their ideas. That is, to boost their *effectiveness* in making decisions, not just their *efficiency* in handling quantities of numbers. Decisions—not numbers—are the new stuff of productivity, and the strength of personal-computing tools is that they allow managers and employees the opportunity to consider a wide variety of alternatives before making those decisions. This only happens, though, when the software is flexible and the personal incentives are right.

But in the institutional computing mode, none of this happens. Worker productivity is suddenly equated with tight control of the data base, restricted types of software—the "paperless office." We are seeing managers dumping the personal-computing task on their junior executives and even their secretaries—feeding them data, expecting them to run VisiCalc and analyze it for them (secretaries are normally not trained in financial analysis); or accepting well-prized litanies from the old EDP school that strict controls are necessary, that personal computers "don't network well," "they don't store enough," "they detract from the power of the central data base"—ignoring the realities of local networking and storage capacities available now through Omninet (Corvus Systems, Inc.) and others, which now may offer as much as 200Mbyte of storage on a local network for about $10,000.
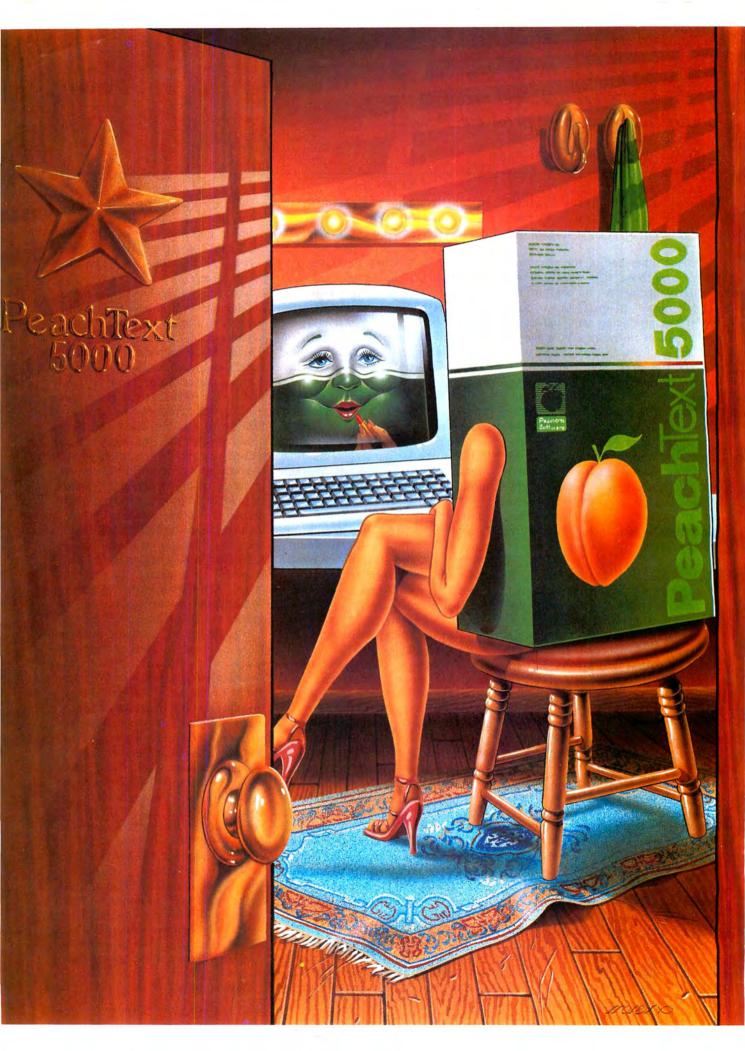
As one industry analyst observed wryly: "The data-processing people think that they have to give away some of their bits and bytes of computing in order to make you more productive." It is indeed a very threatening idea—to distribute the bits and bytes of computing equitably to the many, as a knowledge lever, especially when computing was once seen as the exclusive property of the

EDP department experts who, in the words of one executive, "didn't speak English" and who have, in large measure, kept themselves apart from the rest as the "data-holders," almost a secret society.

That they have achieved this power and feel reluctant to give it up is only natural. But to the extent that we, as managers, have contributed to it—whether it is through our fear of computing, or frustration, or prejudice, or simple laziness, or from a misperceived notion that corporate ends may best be achieved only by established corporate means—we have cut ourselves off from the roots of this new and potentially incredible power, the only power the world will respect in the next 100 years. This is the power to hold, alter, and withhold information. In too many cases already, we have begun to do with "personal" computing exactly as Rousseau had feared, alienating our rights to "what is mine" and "yours" in favor of "ours." And with such frightening consequences to our future that we cannot as yet comprehend them.

I would suggest that this is where Rousseau ends his instructions. A much more cynical philosopher, George Orwell, takes over. We know 1984 is fast approaching. We, as managers, still have a choice. But if we continue to refuse to take responsibility for changing our corporate environments in humane ways, if we strip the personal from computing as we have too often stripped our respect for the individuals who make up our corporate life—who compute and will do the computing in the future—then we will have very little choice. Computing will no longer be a question of "mine," "yours," or "ours." It will become "Theirs." Just as the products of our minds, even our most significantly personal thoughts, will easily become "alienated" or even forbidden forms of property. And we'll have nothing to say about it.

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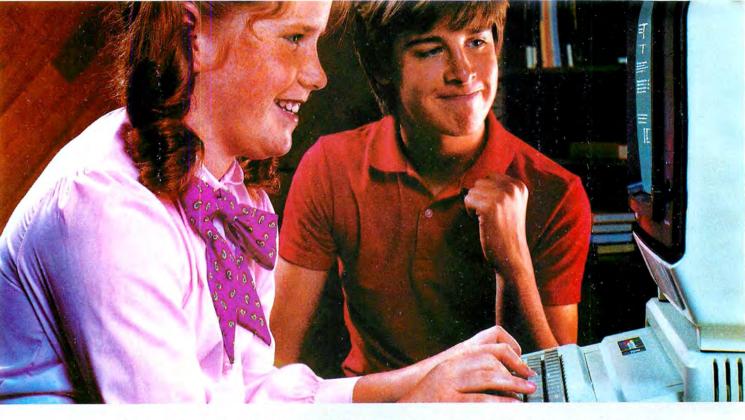
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Insuring Your Satisfaction When Buying Software

With the wide assortment of software packages available in any one category, it can be difficult to choose the package that best suits your needs. You might ask your dealer for advice, and maybe he'll even demonstrate packages for you. But if the package you're considering is relatively inexpensive or is sold only by mail, a demonstration may not be possible. In that case, you're forced to rely on advertisements and package descriptions before writing out a check. What can you do if, after taking the package home and trying it out, you find that it's defective, or that it doesn't live up to its advertising? What legal responsibilities do software distributors have to ensure that packages will perform as advertised?

This column was prepared in consultation with Joseph P. Zammit, a partner in the New York City office of Reavis & McGrath, who specializes in computer-related contracting and litigation. After receiving his law degrees from Harvard Law School (1971) and New York University (1974), Zammit was a member of the full-time faculty of St. John's University School of Law. Since joining Reavis & McGrath in 1978, he has remained an adjunct associate professor at St. John's (teaching computer law), and at New York Law School. He is also a member of the advisory board of the Computer Law Reporter, *published by Computer Law Reporter Inc., Washington, D.C.*

Questions about the quality and suitability of software really come down to the question of what kind of warranty you receive from the vendor when you buy a package. Warranties are subject to several types of commercial law, and in order to be aware of your legal rights as a consumer, it's important to know which laws apply to the sale of software.

Software and the commercial code

The most basic body of commercial law dealing with commercial transactions and warranties is the Uniform Commercial Code (U.C.C.). There is also federal and state regulation governing fair trade practices.

One would think that the U.C.C. and other bodies of commercial law would apply to software just as they apply to purchases of computer hardware. But this is open to some debate. Traditionally, Article 2 of the U.C.C. is viewed as applying to transactions involving the sale of goods. The two key words there are "sale" and "goods." Most software vendors license their software instead of selling it: Thus there is a question as to whether or not Article 2 of the U.C.C. will apply to licenses of software. One argument in favor is when someone spends money for a software package, he is getting a perpetual license for a one-time license fee under conditions that are so much like a sale that the U.C.C. should directly apply to the situation. (Another argument is that even though the U.C.C. doesn't strictly apply by its terms, it's such a useful body of law that we should apply it by analogy.)

The other key term in Article 2 of the U.C.C. is "goods." In the code, goods are defined in terms of being movable (as distinct from fixtures or real property). Now if software constitutes goods, it's not goods in the sense that we normally deal with goods. It's not a piece of equipment. It really constitutes an intellectual construct. Yet it's not pure information, like the content of a book, because it is not simply read; it physically or electronically interacts with a piece of equipment in order to perform a particular function such as word processing.
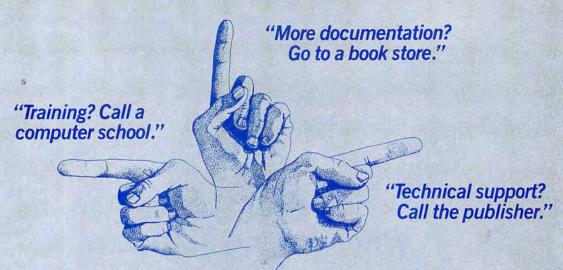
There are good arguments that software is the electronic equivalent of a piece of machinery. To the extent that one purchases a software product to perform a particular function, one could fairly characterize software as goods.

Types of warranties

Let's assume that software is goods and thus that the U.C.C. applies. Under the U.C.C., goods are backed by three basic types of warranties. The first type is an express warranty, which is essentially any oral or written affirmation with respect to goods. It is not necessary to use the terminology "warranty" or "guarantee" in this affirmation. An advertisement, for example, may constitute an express warranty because a manufacturer is making an affirmation with respect to goods.

The other two types of warranties are known as implied warranties. They do not flow from a specific representation or statement made by a vendor; they are, as a matter of law under the U.C.C., implied in every contract of sale *unless* they are specifically and conspicuously disclaimed.

One implied warranty covers merchantability; it basically states that the goods will perform the functions

they're intended to. The other is an implied warranty of fitness. If you go into a store and tell the dealer that you need a product that will do some specific set of tasks, and he sells you something based on his knowledge of your needs, then it is likely that the law will say that the dealer has warranted that the product is fit for that particular purpose. Fitness depends on the vendor's knowledge of the particular needs of the customer, whereas merchantability simply relies on the general standard in the industry for goods of this kind. Under the U.C.C., both types of implied warranties last for four years unless contractually reduced to a shorter period.

Once again, applying these two implied warranties to computer software is not easy. Ask yourself, what is a merchantable computer program? The industry is at a point where it is rather hard to say what a particular program should or shouldn't contain in order to be merchantable. If the program doesn't work at all—if it's full of bugs and generates a lot of gibberish—then it's easy to agree that it's not merchantable. But if you buy the product and it more or less works, but you would expect that any intelligent person designing a program of this kind would have included or excluded certain features, the question of merchantability becomes cloudy.

Even with regard to fitness for a particular purpose, it would be pretty tough to say that the manufacturer of mass-distributed software had any knowledge of the particular needs of the customer. Even the retail dealer may or may not have knowledge of the needs of the particular customer in specific detail.

The vendor's side

Warranty law is a balance of the needs of the customer to be assured of a good product (and remedies if there are problems), and the needs of the vendor to protect himself against unlimited claims for damages.

Vendors have a number of concerns that lead them to want to disclaim certain warranties. Software takes time and money to develop, and the vendor is looking for a return on his investment. He wants to protect himself against theft and piracy, and he wants to limit his legal exposure in the event that an unknown bug in a program results in some kind of a loss to a user.

A vendor has various ways of limiting his liability. First, he can disclaim the implied warranties of merchantability and fitness, and restrict the customer to a specific express warranty. For example, he might state in essence: "I warrant that this software will meet some standard—typically that it will conform to the specification laid out in the manual. I'm not warranting that it's generally merchantable, or that it's fit for any particular purpose: I'm saying that it will do what the manual says it will do."

Second, he might warrant that "If there's a bug in the software such that the program doesn't work the way the manual says it will work, I will give you a particular remedy, but that will be your exclusive remedy." That remedy may be fixing the bug if it's brought to his attention, or taking the diskette back and returning the customer's money. Both are examples of limited remedies.

The more personal computers are used in everyday life, the greater the likelihood that problems may arise. It's worth pointing out, however, that reputable dealers and vendors are looking for a long-term relationship with a customer; they're not just interested in selling one package to one person. Reputable manufacturers are concerned that their products work properly, that their customers are satisfied and happy, and because of this, they're willing to remedy defects or replace damaged diskettes. They may even be willing to take back a program that doesn't work the way a customer legitimately expected it

might work. But they also don't want to be exposed to the potential of unlimited damages. If they did have to take into account such enormous liability, the odds are that software would be a lot more expensive than it is.

The user's side

What recourse do you have if you suffer a financial loss on the strength of a securities-analysis program, or have to pay interest and penalty on your taxes because of some problem in a tax-preparation program? In all likelihood, your recourse may be fairly limited. First, you have to look at the technical aspects of the warranties you received. Did the license agreement properly disclaim any particular warranty of merchantability or fitness for a particular purpose? Did it limit the remedy and exclude other types of remedies? Were those exclusions fair and reasonable? (Under the U.C.C. it is within the power of a court to refuse to enforce "unconscionable" provisions; what is unconscionable in the personal computer context, however, is yet to be decided.)

You can protect yourself by carefully reading the product advertisement to see what it says in terms of your right to examine the software package and return it if it is not satisfactory. It is not uncommon in mail-order transactions for the seller to offer a 10-day examination period, during which your money will be refunded if you don't find the product satisfactory. In the event that an examination period is not spelled out, you might be wise to charge the purchase on a credit card; you may receive the product and establish whether or not you find it satisfactory before you pay your credit card bill.

There is also the Magnuson-Moss Consumer Warranty Act, a federal statute administered by the Federal Trade Commission. This statute is designed to enhance the legal protection of consumers, to give them pro-

tection beyond that afforded by the U.C.C. for "consumer" transactions (as distinguished from commercial transactions). The definition of consumer transaction under the statute is quite broad; the term "consumer product" means tangible personal property which is normally used for personal, family, or household purposes. Now, just as with the U.C.C., there is some debate as to whether the Magnuson-Moss Act protects software. The debate centers on the question: Is software tangible personal property? Daniel T. Brooks of Computer Law Advisers (Springfield, Va.) takes the position that mass-distributed software is so identified with the physical medium in which it comes that it should be viewed as tangible personal property. Others tend to think of software as intangible intellectual property—similar to the content of a book—even though it may be embodied in a tangible medium.

But if software is tangible personal property, then the next question is, is it normally used for personal, family, or household purposes? If so, then the Federal Trade Commission takes the position that as long as it's not uncommon to use it for personal purposes, it's a consumer product.

Assuming software is covered by the Magnuson-Moss Act, the statute gives consumers important legal protection. For example, if the vendor gives you any written warranty at all—such as stating that the software will conform to the manual—under the Magnuson-Moss Act he may *not* altogether disclaim the implied warranties of merchantability and fitness. Those go along in the package with any express warranty. All he can do is limit the duration of the implied warranties to the same period of time as the express warranty. Therefore, a blanket disclaimer of the implied warranties probably would be deemed invalid. (However, *caveat emptor*: A seller *can* disclaim *ALL* warranty liability, both express and implied, and be within his rights under the Magnuson-Moss Act.)

How to take action

What can you do if you discover that software you've bought is physically defective, or has a bug, or does not work satisfactorily for your purposes?

First try working out an informal remedy of taking the package back to the dealer or sending it back to the mail-order distributor. A reputable dealer may very well accept a return or exchange, because he wants to establish a long-term relationship with satisfied customers.

If you can't resolve the problem informally, however, you can exercise your legal rights under the U.C.C., Magnuson-Moss Consumer Warranty Act, and various state statutes against false advertising and deceptive trade practices: You can sue. Of course, if you're dealing with a product that costs $100 or $200, it may not be worth the aggravation of going to court—even though under the Magnuson-Moss Act you can recover attorneys' fees if you win. However, small claims court may be a viable alternative; there you can assert a claim under one of these statutes and point out that at a minimum, you're entitled to your money back. Consumers tend to get justice in small claims court because the judges are more inclined to lend a receptive ear to claims predicated on fairness instead of on strict, literal interpretation of statutes.

You can also register a complaint with an appropriate consumer protection agency, such as the state attorney general's office, or the Federal Trade Commission. If your case is not isolated, but you have been the victim of a general rip-off by a particular firm, those agencies may very well bring an action on behalf of the public interest to enjoin the continuation of the practice.

As a last resort, you might also want to take advantage of the ambi-

guity as to whether or not software can be considered goods, and thus may not be covered by the Uniform Commercial Code. Under some circumstances you might, in fact, want to argue against a vendor that software is not goods, but a service. In so doing you might be able to circumvent certain disclaimers of limitations of liability that are outlined in the license agreement. One way of doing that is by suing in what is called "tort"; tort is liability imposed as a matter of law and public policy, not as a matter of warranty or contract. If you argue that software is a service and not a good, you might be able to sue the vendor for negligence in manufacturing or producing the software. The reason that the distinction between goods and services is important is that most jurisdictions do not allow a purchaser to sue a manufacturer of goods for negligence when the only alleged damage arising from the negligence is an economic loss.

Rule of thumb

A consumer's best and foremost protection is to do business with reputable dealers, and to buy software packages manufactured by known entities that want to establish a long-term base of satisfied customers. There are, however, a series of interrelated federal and state laws that protect consumers when they purchase goods. Depending on whether software is considered goods or services, these laws can be invoked by a user, when necessary, to sue for the satisfaction.

If you have questions regarding personal computing and the law that you would like to see discussed in future columns, address them to:
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Personal Computing
50 Essex Street
Rochelle Park, NJ 07662
Sorry, we cannot personally answer or acknowledge questions. 🎗

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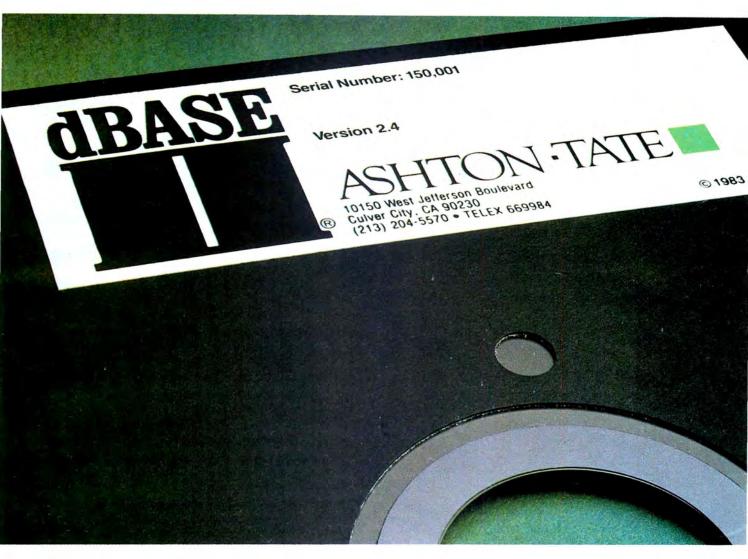
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CIRCLE 50

Walk Right In, Sit Right Down . . .

ERGONOMIC PRINCIPLES IN OFFICE AUTOMATION
ANACONDA ERICSSON INC.
PUBLICATIONS DEPARTMENT
P.O BOX 938
GARDEN GROVE, CA 92642
165 pp., $14.95 plus shipping and handling

Although the term "ergonomics" appeared in the jargon at virtually the same time as "office automation," it has only recently begun to show up in advertisements and literature for personal computers, peripherals, and accessories. Everything from computer keyboards to pencil cups is suddenly "ergonomically designed."

Once upon a time, a chair was something upon which to sit. No more. These days, chairs are "ergonomically designed," which means they are constructed, hopefully, to provide the maximum comfort for the sitter which allows him to focus on his productivity. Obviously, the same notion can be applied to everything involving work, including—indeed especially—desks, chairs, keyboards, and screens; even the work environment.

This is no minor matter. As the folks at Ericsson point out, "Ergonomics is . . . the science of how equipment should be designed and how the office environment should be controlled to suit man." In order to produce a book which reviews "the state of the art," Ericsson, one of Europe's major computer manufacturers, hired ERGOLAB AB, a Swedish consulting and research firm, to search the literature worldwide—and the book, the fruit of their research, may very well set the stan-

dards for ergonomics for many years to come.
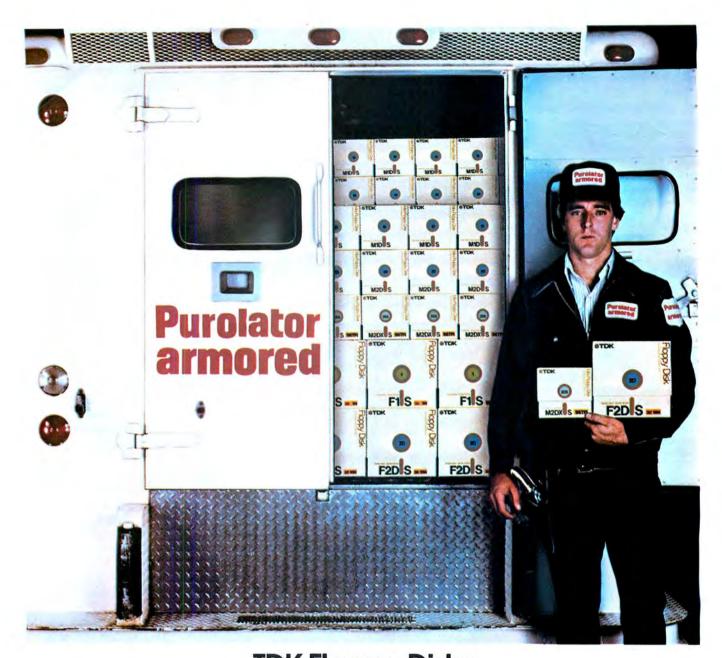
The book is divided into six sections: The Visual Display Unit, Keyboard Design, Workstation Design, The Software Interface, Health and Safety Aspects, and Organizational Aspects. Each section has been edited by an expert in that particular field.

These guys aren't kidding around, either. While folks like us are haggling over the pros and cons of dot-matrix vs. letter-quality printers, they're making statements like: "The dots in a dot matrix should be round or square and not elongated. A square dot is in fact better...." Things like keyboard height, the shape of the key's surface, the color and lettering of keyboards, work posture, reach and viewing distances, desk and chair heights, lighting, room temperature, and scores of other factors that contribute to an ergonomically designed workspace or piece of equipment are reviewed, complete with guidelines and recommendations. It's a far cry from those "good old days"—1975 or '76—when it was merely a question of placing tab A in slot A, applying a soldering iron, and hoping for the best.
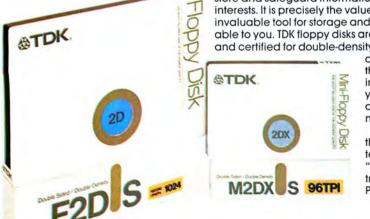
Each section ends with a summary of the guidelines, but there's also a separate chapter devoted to "Standards, Recommendations, and Union Guidelines."

Ergonomic Principles in Office Automation concludes with a rundown of people and places currently doing research in the field, complete with names and addresses. Reference materials and bibliographies are given throughout. And, of course, there is a detailed index and a fine glossary.

For all its seriousness, though, the book is not without humor, however

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BOOK REVIEWS

unintentional. When you decide to establish standards, you have to establish them for everything. That's why the glossary defines "envelope" as "the part of a total message which is concerned with the control and command of transmission to and from defined destinations of the data message contained within it." I wonder how long it took to come up with that one.

Ergonomic Principles in Office Automation should be on the shelf of every computer designer, peripheral manufacturer, furniture maker, office manager, data-processing executive, and anyone else concerned with the human factors involved in work in the computer age.
—*Marvin Grosswirth*

A Primer on Small Business Computers
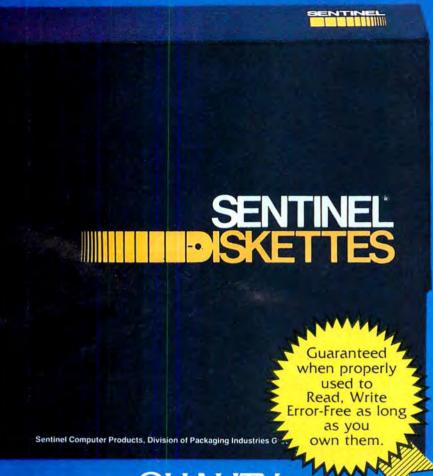
HOW TO CHOOSE YOUR SMALL BUSINESS COMPUTER
MARK BIRNBAUM AND
JOHN SICKMAN
ADDISON-WESLEY PUBLISHING
CO., INC.
READING, MA.
150 pp., $9.95

There's nothing really wrong with this book—it just doesn't quite deliver what the title promises. Instead of being a guide to selecting a small computer, the book is just a relatively simple primer on small business computers with some useful explanations of specialized terms and a few basic checklists. It says absolutely nothing about particular computers or specific software packages. In short, the reader will still not know which system to buy after finishing this book.

In the opening chapter, the authors, both of whom are computer consultants, compare buying a computer to purchasing a stereo system. In their analogy a turntable, a tape deck, an amplifier and speakers, plus records and tapes, are required for listening to music. That's all well and good, but I'd like to know whether I need a 20-watt or a 50-watt amplifier, or whether I'd be better off with a Kenwood or a Marantz. And when

BOOK REVIEWS

it comes to buying albums, I'd like to know what choices I would have in buying a recording of Beethoven's Ninth Symphony.

The authors stop far short of answering such practical questions concerning small business computers. Putting a small computer to work in a business is sufficiently complex and fraught with potential disasters that the soundest advice for a novice is to seek the guidance of an expert. Reading this book will be of value only as a supplement to real help from a qualified professional.
—*Jeffrey Bairstow*

Way Down In The Valley

THE OFFICIAL SILICON VALLEY GUY HANDBOOK
PATTY BELL
AND DOUG MYRLAND
AVON BOOKS
NEW YORK, NY
105 pp., $3.95

Almost by definition, satire and parody are exaggerations—basic truths stretched to the point of absurdity. To be sure, satire and parody have not always been fully appreciated, which is why, in simpler days, some parodists and satirists had their promising careers abruptly ended by various extreme measures, such as deportation or decapitation.

While some may find this "Official Guide" a trifle offensive in spots, I would allow its perpetrators to retain both their citizenship and their heads. With the help of Bob Glazar posing as "Ray FIFO," the authors have managed to produce a gentle and surprisingly sensitive spoof of the stereotypical computer *wunderkind* lurking about laboratories and back rooms, as personified by FIFO as he appears on the cover: average-looking, bespectacled, his pale-blue

polyester trousers a trifle too short, a wrinkled corduroy jacket (tan, of course), and a plastic pocket protector abulge with writing implements. And an ID badge. And a clip-on tie. And a beeper on his belt.

The handbook purports to describe (for those who wish to become one) the making of a Silicon Valley Guy (SVG)—from teenager ("Rebel without a compiler"), through career development, on through social development ("SVG Couples: Life in the State of Holy Micromony")—all the way, inevitably, to Burnout. ("Hello, I must be going.")

The Silicon Valley Girl, incidentally, is summarily dealt with in a two-paragraph chapter in which she is described as "simply a Silicon Valley Guy with longer hair and smaller feet."

The SVG's penchant for organizing (if that's the word) his entire life around his computer is relentlessly pursued. For example, recognizing the need for some sort of exercise, however repugnant the notion may be to a true SVG, the authors recommend a form of isometrics in which you "place hands on sides of terminal and press in. Hold this for as long as it takes the print head to output fifty copies of your resume." You get the idea.

There are three major faults with *The Official Silicon Valley Guy Handbook*, the first of which is admittedly idiosyncratic: I don't like things that are self-designated as "official." Second, as is almost inevitable with any attempt at humor that lasts for more than 15 minutes, the joke wears a bit thin in spots. And finally, I don't think Bob Glazar as Ray FIFO adds very much. Some of the photos in which he appears are silly to the point of being puerile; others are simply incomprehensible.

These are, however, minor shortcomings. *The Official Silicon Valley Guy Handbook* is a lighthearted, clever, genuinely funny piece of work. About the only people who won't ap-

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CIRCLE 55

preciate it are in-house systems analysts, programmers, field engineers...you know, the ones with the white socks, wrinkled corduroy jackets, and clip-on ties.

—*Marvin Grosswirth*

Show And Tell

THE COMPUTER CAMP BOOK
YELLOW SPRINGS COMPUTER
CAMP, INC.
YELLOW SPRINGS, OH
227 pp., $12.95

Fortunately, the publisher of this excellent reference work and guide has chosen to make it available only through mail order. If you saw *The Computer Camp Book* in a book or computer store, you would probably pass it by, on the assumption that it was a slapdash, hastily put together piece of work resembling the sort of thing one brings home from summer camp.

Tom Copley is an associate professor at Antioch College in Yellow Springs, Ohio. In 1982, inspired by the success of others, he decided to establish a computer camp and within three months was, as they say, up and running.

His operation was so successful that he put together a handbook for others, which, with numerous outside contributions, particularly from parents and his camp staff, evolved into the finished product, *The Computer Camp Book*. Well, product it is; whether or not it's "finished" is a matter of opinion.

There's no quarrel with the information in this book, which is roughly divided into two categories. It would appear—with one glaring exception—that if someone were interested in establishing a computer camp, just about everything that needs to be done, and how to do it, is carefully detailed here. The excep-

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In short, the PT-88 puts it all together— reliability, flexibility, performance, and low-cost operation—all in one compact, super-silent unit. The result is a printer of exceptional long-term value. Now the question remains— Is it incomparable? Second-to-none? The epitome of excellence? We'd want you to decide for yourself. One thing's for sure. It's remarkably quiet. And in an increasingly noisier business environment, we think that's something you can appreciate.

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tion is the absence of any discussion of red tape.

Summer camps, depending on locale, fall under various jurisdictions, such as state and local health and education departments. Nowhere does this book discuss how to deal with— or where to get information about— conforming to regulations, obtaining licenses, etc. Everything else, however, seems to be here, ranging from the kinds of programs (computer and activity) with which to get started, to how to get supplies and equipment— which is sometimes free.

Even educators and planners interested in establishing an extra-curricular activity could gain a wealth of ideas and insight from *The Computer Camp Book*.

In the second part of the book the author gives a detailed rundown of the types of camps now in existence, including tips on how to choose a camp for your child and a detailed list of camps from which to make that choice.

Sounds like a fine book, doesn't it? It is, if one stops at content and organization and has no interest in the quality of the physical product. For instance: The heavy type prints through to the reverse side of the page, the editing is sloppy (I haven't seen "recieve" on anything other than high school papers); and the overall design suggests a cheapness unworthy of the book.

The end result, however, is a worthwhile guide that parents interested in establishing a computer camp—or just sending their kids to one—ought to be reading. So what if the type is uneven and some of the illustrations are too small to be legible?

(*The Computer Camp Book* can be ordered for $12.95 plus $2 for postage and handling from Sharon Sandusky or Chel White, 8327 Sheridan Lane, Eden Prairie, MN 55344.)

—*Marvin Grosswirth*

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A Programmer's View

USING THE IBM PERSONAL COMPUTER
KENNISTON W. LORD, JR.
VAN NOSTRAND REINHOLD CO. INC.
NEW YORK, NY
338 pp., $19.95 cloth/$12.95 paper.

Ken Lord, the author of this book, has been a programmer for more than 20 years and is quite a well-known figure in business data processing through his involvement with the Society of Certified Data Processors. That experience and expertise is reflected in the book, which is a comprehensive guide to the IBM Personal Computer.

However, the book assumes that the reader wishes to use the IBM Personal Computer by doing his own programming—in BASIC, at that. Consequently, the book is full of BASIC programs, some of which run to several hundred program lines. Not only is great persistence required to follow and eventually key in such programs, but a novice will inevitably make errors and have great difficulty debugging the programs. Virtually no mention is made of methods for debugging complex programs. Thus, this book will appeal mainly to the programmer and not to the novice.

A major factor in the success of the IBM Personal Computer has been the availability of software packages for both business and home use, particularly packages that can be used without programming knowledge. A recent advertisement for the IBM Personal Computer listed over 1000 available software packages, and those were merely the programs given IBM's official endorsement.

The author is silent on such packages. No mention is made, for example, of word-processing and spreadsheet calculator programs, two of the most popular applications for the IBM Personal Computer. Yet almost a third of the book is devoted to a series of business programs developed by the author and available from him. Tucked away in the last sentence of the book is a note suggesting that readers write to the author for details.

If you like to write BASIC programs and have an IBM Personal Computer, this book will certainly be valuable. If you've just acquired a Personal Computer and need help, this book is not the place to start. If you're thinking of buying an IBM Personal Computer for home or business use, this book will not give you the advice you need. In fact, I've yet to read the book about the IBM Personal Computer that would make a novice want to buy one. Any suggestions?
—*Jeffrey Bairstow*

Getting Down To Business

SIMPLIFIED GUIDE TO SMALL COMPUTERS FOR BUSINESS
DANIEL R. MCGLYNN
JOHN WILEY & SONS, INC.
NEW YORK, NY
241 pp., $14.95

This is a book for busy people who need information, and who have neither the time nor the inclination to wade through meaningless "background" material that is of little value and even less interest.

Free of padding, devoid of the kind of gee-whizzism that so often characterizes "simple" introductions, this guide sets out, in a clear, straightforward manner, to acquaint the manager—whether department head, entrepreneur, or professional—with everything he needs to know to make an intelligent decision about computerizing.

The author begins with a careful analysis of what one must contend with when confronting the computer

market, giving a clear, concise, and eminently readable description of its size, its scope, and its various components and how each affects the type of business operation being considered for submission to those clever little chips. He is sufficiently thorough and objective to include an excellent overview of alternatives to in-house computers, such as service bureaus and time-sharing.

The full range of computing capabilities—from telecommunications to word processing—is covered, but always from the managerial point of view. The section on budgeting, for example, never mentions the word "household," and you won't find "games" listed in the index. When McGlynn says "business," he means business.

There are checklists throughout the book which not only assist the reader in making ongoing evaluations, but provide a fairly complete and painless course in computerese.

Other valuable topics covered in the *Simplified Guide to Small Computers for Business* are various computer applications in such business aspects as marketing, financing, personnel management, manufacturing, wholesaling, retailing, and the like. Detailed descriptions of appropriate software are, of course, included.

Throughout the book, McGlynn names brands and even includes an appendix which describes nine specific systems, including a few IBMs, the Xerox 820, and the HP 125.

Two chapters on acquisition—one a feasibility analysis and the other on acquisition methods—are alone worth the price of the book. *Simplified Guide to Small Computers for Business* is the sort of book entrepreneurs and professionals should be reading on the morning train.

Corporations should be giving copies to their senior and middle-management executives still suffering from technophobia.

—*Marvin Grosswirth*

Microcourse

A 60-MINUTE GUIDE TO MICROCOMPUTERS
LEW HOLLERBACH
PRENTICE-HALL, INC.
ENGLEWOOD CLIFFS, NJ
137 pp., $6.95 paperback

Listen, Lew, I'm going to a party tonight. Most of the people there will be computerniks, and I don't know the difference between a disk drive and a sex drive. Can you give me a quick rundown on what I need to hold a reasonably intelligent conversation?"

"Sure. Start taking notes. This will take about an hour, OK?"
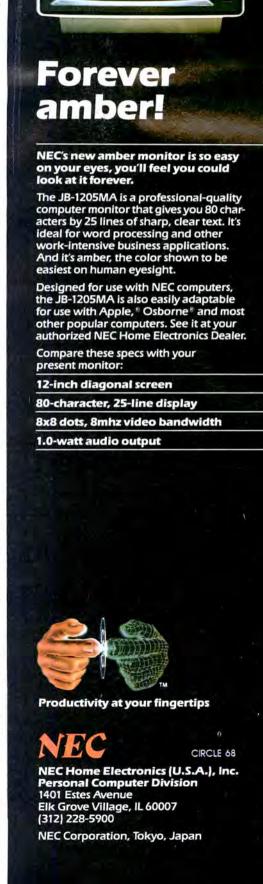
Of course, I just made that up; I have no way of knowing the actual source of inspiration for this book, which is subtitled "A Quick Course in Personal and Business Computing." The point is, however, that it could have been born that way.

Or, it might have been motivated by the lament of a computer widow (er) bemoaning the fact that her beloved spouse is speaking in an unknown tongue about matters of profound mystery and confusion. Perhaps the book was inspired by an executive being badgered by an underling to authorize the purchase of a personal computer. Whatever the actual origins, the author clearly identified a need for a short, easy-to-understand, and reasonably comprehensive rundown on computers.

This is a fine little book. It has all the essentials and none of the embellishments that sometimes make computer introductions lugubrious to the point where the reader feels like he's wading through Jell-O.

The computer-ignorant executive, professional, or entrepreneur who would like to know more about the pros and cons of data processing would do well to read this book on the train instead of the morning newspaper. It will be an hour well spent.

—*Marvin Grosswirth*

(continued from page 27)

without your having to tell it what to do. There's a trade-off, because total memory address space in any computer is constant. So the more memory the manufacturer takes up with ROM, the less RAM you will be able to work with.

Q: Recently I tried to use a tape recorder I use with my TRS-80 Model I on my friend's Commodore computer. We tried to load Commodore programs but they didn't load. We can't understand why.

A: The tape recorder used with the Commodore is different from the recorder used with the TRS-80. The TRS-80 uses a standard tape recorder using the frequency shift keying system. This system uses two tones to record digital data from your computer. The Commodore uses a digital tape recorder using the pulse width modulation system. In this system, the recording head of the tape recorder is turned on and off for different periods of time by the computer. This causes the pulse width to vary depending on the digital data which is being stored.

Q: What do I need to consider before upgrading my system? And where should I go for further advice?

A: You should first examine your reasons. If you just want to own the latest equipment, then there's no real need to update. But if there's something you want to do that your present system can't accomplish, then by all means proceed.

When deciding *how* to upgrade, make a careful survey of the applications you want to run. Then, with your needs clearly in mind, survey the software offerings available. Sit down and try the packages out. Make sure you know what each can and can't do. In this way, you can select the software that's right for your particular application, and right for you.

The choice of software leads inevitably to the choice of hardware. Some packages will run only on the newer 16-bit systems. If those are the packages you want, then you'll know the kind of computer you need. Or, more generally, when you know the operating system the software runs under, that will specify a particular kind of machine. Suppose, for example, you need to run 1-2-3 from Lotus Devel-

opment. This package runs only on the IBM Personal Computer and compatible systems with sufficient memory. That narrows the field a lot. All you would need to do is run the package on those few computers and compare them.

We also recommend establishing a good relationship with a dealer, one with whom you feel comfortable, and who will continue to offer further advice and support. This kind of dealer won't steer you wrong, because he's interested in satisfied customers, not unhappy ones who will spread their distress all over town.

Q: Do I need a fan for an Apple II Plus?

A: It depends on how many cards you put into your Apple. We have fans on most of the Apples at *Personal Computing*, because we can't afford difficulties due to hot power supplies, and because we have lots of accessory cards in many of the computers. Generally speaking, if you have an 80-column display and/or a CP/M card, we recommend you get a fan for your computer just to be sure it will stay cool. If you only

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have a disk drive and printer controller, then your II Plus will probably be fine without a fan.

Q: What are these integrated software packages I hear so much about? Are they better than individual ones for each function?

A: Integrated packages provide more than one function in a single package. Popular ones provide a data-base manager, a spreadsheet and a graphics package, along with word processing. The neat trick is that the spreadsheet, the graphics package and the word processor can all access the data base. So if you have to prepare a document that will include columns of figures and a graph that explains what the columns mean, you can do it with the one package. Before the advent of integrated packages, you would have to run three applications to get the same result. Then you would have to paste the report together, which wouldn't provide a very professional appearance.

Integrated packages probably won't give you as good a function in every one of their capabilities as you

could get from separate packages. One might have a terrific data-base manager, but not such a good word processor. Another might be the best spreadsheet for your needs, while the data base might leave something to be desired. On balance, though, the integrated packages are very powerful exactly because of that integration. It's not likely that most people need the capabilities of the most advanced word processor, the latest whiz-bang spreadsheet, the most flexible data-base manager, and the most versatile graphics package all at the same time. The integrated packages do a good job of optimizing the applications to give you a very powerful mix of features.

Q: In your June issue, you mentioned a Zork User's Group. Where does it meet, and how can I contact it?

A: The Zork User's group has, until recently, been operated by private individuals as a labor of love. Now, other demands leave them with no time, so Infocom, in Cambridge, Mass., is taking over operation of the group.

Q: In the July issue, you show how a computer works by explaining a simple add function. You end by saying, "If you add together more of these instructions, then the end function gets more complex, and more useful." That, it seems to me, is the real question. How does the jump from such a simple function to diagnosing medical functions or planning a space launch occur?

A: As we said, by adding together lots of these simple things. If I want to diagnose a medical condition, then first I need some information that describes the condition I want to diagnose. That has to be gathered by people and input to the computer. Then I would tell the computer to look up lists of symptoms that equal the symptoms I've input. The computer takes that command and moves into its memory from permanent storage information that describes medical conditions. It then compares the information it got from storage with what I gave it. Every time it gets a match, it stores the condition that matched for later printout.

As you can imagine, each match takes thousands of instructions. But they were nothing more than the sim-

ANSWERS

ple instructions we showed, strung together into a very long program.

Q: Is a computer whose keyboard has lots of programmable function keys better than one without them?

A: There are two schools of thought, according to Jim Schwertman, the assistant store manager of RAC Computers in San Jose, Calif. One says that for heavy users, it's most efficient to memorize control key sequences. This way, you never have to break your rhythm by looking down at the keyboard. And your hands can stay hovering over the home row, just like they teach in typing class. You might have your word processor program delete words by hitting the Control key and the D key simultaneously. A simple keyboard also makes for more economical hardware and a physically smaller keyboard.

The second school of thought says that well thought-out function keys make it much easier to learn how to use your system, and are ideal for the infrequent user. Also, if you're a hunt-and-peck typist you're going to be looking down at the keyboard anyway—so you might as well have function keys, even with labels—to make your work easier. The most elegant function-key layouts usually have a row just beneath the CRT display, with the key labels displayed on-screen just above the keys. This way you can use hierarchies of menus, with the key labels changing as needed when you go from area to area, letting seven or so keys give you the effect of having dozens of function keys—without all the clutter. The Hewlett-Packard HP-86-87 uses this layout. On the other hand, the Epson QX-10/Valdocs system uses hardware-defined function keys for the commands used most often by most people. This is easier to remember.

The availability of alternate key-

board inputs (mice, voice, light pen) and integrated software (with unified command structures) will lessen the need for function keys. The hardest thing to evaluate is which keyboard will work best for you six months after you get your system.

Q: I've heard that the arrival of fifth-generation computers is imminent. What does this mean?

A: Trying to pin down generations of computers is like nailing jelly to a tree. The fifth generation of computers is something said to be coming from Japan. Presumably, such computers will have more capability, more memory, faster execution speed and a better user interface. Time will tell if new computers soon to be unveiled are really a "new generation," or if they're just an evolutionary growth of today's products.
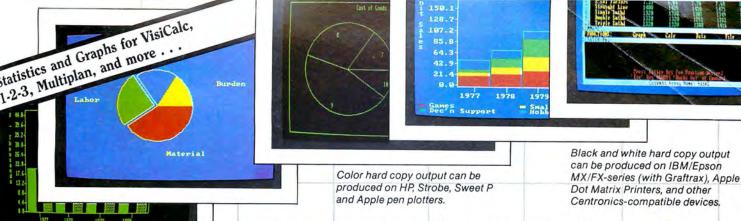
Q: Will I be going out on a limb if I go ahead and get one of Apple's Lisas?

A: We talked with one computer dealer we know about whether this $10,000 computer was making an impact on his customers. He has been candid about product strengths and shortcomings in the past, and is familiar with Apple's inner workings.

This dealer said his biggest worry was that Apple had estimated production needs too conservatively. He's worried that he won't be able to get enough of the first year's production allocated to satisfy his customers. At the time of writing, this California dealer is seeing mostly single sales to corporate managers. These pioneering customers have told the dealer—let's call him Phil—that the system draws a crowd of associates wherever it's set up, and the new owners tend to enthusiastically pitch the product to their workmates. After all, anyone who's just spent $10,000 on an office machine is likely to want

to justify the purchase to his or her peers. And according to our source, his customers have been very successful in selling their friends on the computer. The price becomes a lot less of an obstacle once they understand that it includes 1Mbyte of memory, a hard disk drive and a full integrated software package. The advent of Applenet and mainframe communications links will help too. Applenet will allow an office to combine Lisas, Apple IIes and IIIs into a coordinated system. That's good, since few firms are going to put Lisa on everyone's desk!

"Phil" concludes that, given corporate buying styles, multiple orders from his customers' firms will start swelling just as you're reading this. If his observation about Apple's conservative production estimates are true, then you may find yourself on a waiting list if you defer your decision for long.

Q: If all computers use binary math, where do more complicated mathematics like Boolean Algebra enter the picture?

A: Boolean Algebra is used for manipulating logical values and expressions. Engineers use this algebra in the design of the logic circuits that go inside the computers and perform the binary mathematics at which computers excel.

Q: Is there a way to reduce the glare from my monitor short of replacing it with one of the non-glare variety?

A: You can get a glare-reducing screen at most computer stores. These devices fit over your monitor screen, and reduce the shine of ambient light on the surface.

You can also fashion a hood for the CRT that keeps the light out. The hood can be made of almost anything opaque, like cardboard or plastic. Fasten it to the monitor with tape,

and adjust it so the ambient light doesn't get to the screen. Presto—the glare should be gone.

Q: I want to learn about computing, but I can't afford most of the machines I see advertised. Is there an inexpensive computer I can buy to learn on?

A: There certainly is. The Timex personal computer has been advertised for about $50, and is available in many general retail outlets, so you can learn all about bits and bytes without even going to a computer store. Just walk into any local store that deals in consumer electronics, and tell the folks there you want a Timex computer.

The machine uses your TV set as a monitor, so you don't need to spend more money to see what you're doing. Just plug the computer into the TV, plug the transformer that comes with the computer into a wall socket, and you're in business.

What you don't get at that price is any packaged software. But that's OK. The book that comes with the computer teaches you to do BASIC programming, so you can write your own programs right off the bat. There's also a cassette port on the computer, so you can save programs to tape.

Once you've worked with the computer for a while, you'll want to do more. This isn't a problem, since more and more companies are publishing software for the computer, and hardware manufacturers are turning out a slew of add-ons, like more memory. So your Timex is expandable, too.

By the time you read this, there may have been another round of discounts in the low-cost computer market, so you should keep an eye on the prices of such machines as the Texas Instruments 99/4A and 99/2, and the Commodore VIC 20. The computer field is moving so quickly that someone may come out with a ma-

chine that undercuts all the computers we've mentioned, but we've given you a good starting point.

Q: Is floppy disk storage capacity an important consideration in shopping for a computer system?

A: It depends on the type of software you're running and your level of expertise, according to Patti Dougherty of Infomax in Walnut Creek, Calif. "Somebody who's used to switching software cartridges on a home computer won't be bothered by swapping diskettes," she says. Most home or even small-business users don't have such large data storage requirements to make an important difference between, say, 140k per disk or 360k per disk. If the application is a large accounting system or database management, however, disk density is a much more important consideration."

Q: I have a Diablo printer connected to my computer's RS-232-C port, and I want to add a modem. Can I connect the printer to the parallel port?

A: You can but you'll need a different interface on the printer. You'll have to go to your dealer to see whether the interface is available, and whether he can install it.

There's an easier way, though. Many of the printer buffers on the market allow different input and output interfacing. While we're not familiar with all the details, we do know that some of them input parallel and serial data and output serial data from more than one port. Try looking at the Buyer's Guide to buffers and spoolers in our July issue.

There's still another, less expensive option. Go to a computer store, or a computer supply store and get an RS-232-C switch box. It will let you connect your printer and your modem on one side, and the serial port on your computer to the other side. A simple

manual switch will allow you to output to one serial device or the other.

Whichever way you go, make sure you have all the right cables before you leave the store.

Q: How can I use graphics on a computer?

A: There are several ways, ranging from very easy to difficult.

First, most BASIC languages supplied with personal computers have graphics commands in them. These include commands like DRAW, PLOT, COLOR, etc. You have to learn how to use these commands, but it isn't too difficult to create a program that will draw color pictures on your video monitor screen.

If you want to print or plot your drawing, then you have to take another step. You'll need the appropriate mechanical device, and some way to get your plotted information from the screen to the printer or plotter. Fortunately, this can be done very easily by using software like PFS:Graph from Software Publishing in Mountain View, Calif., or Graphics Processing System from Stoneware in San Raphael, Calif. These programs support specified printers and plotters, and are an easier way to get input than by writing a BASIC program.

But if you start by writing graphics programs in BASIC and you want to plot the results, you'll need an interface that handles graphics for your printer. There are a number of these, such as the Grappler Plus from Orange Micro in Anaheim, Calif. They take the graphics information on the screen and reproduce the image by converting it to data which can be understood by a dot-matrix printer.

So, you have a number of choices. Try it from BASIC, and see if you like it. If you don't, then try some of the easy-to-use graphics packages available. If you like generating your own pictures, you can get a printer interface for graphics, or a plotter and plotter interface.

RE BUYER'S GUIDE
will have to answer them later.

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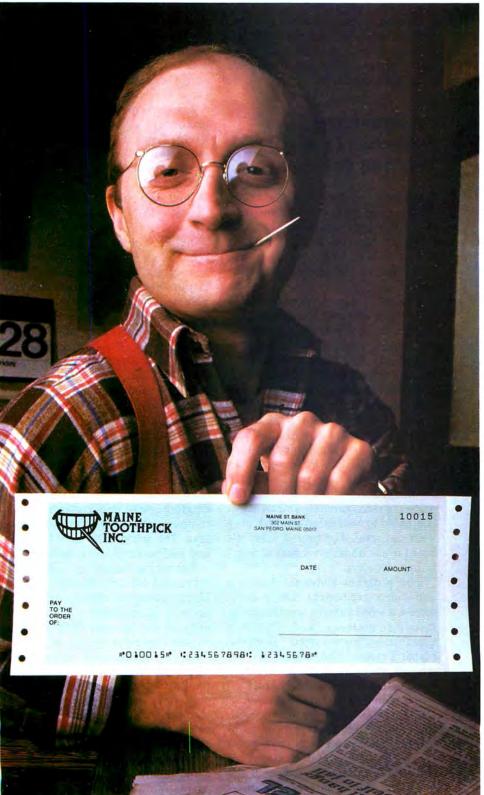
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CIRCLE 79

PEOPLE IN COMPUTING

braille, so it doesn't require learning regular letters like some systems do." Fowler even uses VersaBraille to write letters on the bus during his morning commute.

An Innovative Approach To A Required Skill

When teacher Jean Mether moved three Apple computers into her typing classroom, her students at Northwest Junior High School in Coralville, Iowa, quickly responded to the computer-assisted lessons.

The move was a popular one in both the school and the community. Northwest Junior High is known as an innovative school that encourages new trends. And many students have already become interested in computers. "The result is a new generation of students who really see nothing revolutionary about a video game in the typing classroom," says Mether.

Since the first Lightning Software MasterType Disk was brought into the school by media specialist Mary Jo Langhorne, students have been using the video game constantly. "I'm beginning to worry that our disk may wear out soon. For over a year, it's been in use about six hours a day," Langhorne says.

The program combines learning and video excitement. On a color screen, a wizard shoots laser beams at missiles, meteors, and satellites launched by "enemy words" from the planet Lexicon. The missiles are destroyed when the student types the word correctly on the keyboard.

According to Mether, the value of the game is that in order to score well, the students must use proper technique. The game rewards good typing, and also reinforces spelling skills. "It's interesting to watch the children. They move from curi-

osity, to frustration, to exuberance," she says.

"The game teaches by repetition. No matter how long it takes, the word will keep popping up on the screen until the student types it correctly," she explains.

In her beginning typing classes, she teaches the keyboard for about three weeks, then lets each student move on individually. When first demonstrating the video game, she assembles a group of five or six students around the terminal and shows them the fundamentals of using the computer.

"At this point the game is ideal, because it's an incentive for the slow learner, and becomes a reward for the fast learner. Students begin to recognize what they need in order to progress," Mether points out.

Eighth graders grumble less about the drudgery of typing drills in the school's required beginning typing class. "I find my typing students greatly encouraged by the game," Mether says. "They even come in during study hours and after school."

According to Mether, Northwest Junior High has plans to increase the use of computers in the classroom. "Already, educational software is being used in the social studies and language arts departments, and a computer class is very popular," she says. The school now has 15 Apples, and will be purchasing more.

Describing herself as "near retirement, and not a traditional teacher," Mether feels that video games have a definite educational value. As she looks at her manual Olympia typewriters sharing space across the aisle from the sophisticated technology of the Apples, Mether reflects on what the future classrooms may be like.

"I only wish I were 20 years younger," she says. "There's so much happening in new applications for computer software in education. Innovations like the use of a video game in my typing classes are just paving the way." ⓛ

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family, up and down the range, and operate. We've announced the methodology behind that to software developers, and they're pretty excited at the prospect.

But in the technology business, when it comes to, say, a new interface, you have to decide whether to link the old to the new, or the new to the old. If we had required that the Lisa run everything that had run on a II, it wouldn't be out today.

However, it's incumbent upon us to maintain compatibility on our Lisa—and Lisa-like products—into the future, and that will happen. And there will be capability for moving files from the Lisa line to the Apple line and back.

What's your view of the Apple II line? Some people already refer to the II as the Model T of the industry—with affection, of course.

Kvamme: Some people might say that it's a six-year-old product, but it's six years old in that it has six years of software development behind it. That's why the total number of software packages for the II runs into the five significant figures. But the II became the II Plus which became the IIe, and there will be future members of that family as well.

In a very real sense, the IIe is only a six-month-old product, as far as the hardware is concerned. It's erroneous to draw a Model T analogy—Model T's wore out, and personal computers usually don't. Our research shows that the average customer uses his Apple for 1.8 things. The Apple II is more than enough for a lot of those 1.8 applications, and that's all many owners want to do.

Will the Japanese become a major influence in the U.S. personal-computer market?

Kvamme: The Japanese are already very successful in personal computers—in Japan. The Japanese market is very often used as a test market by the Japanese manufacturers; there are almost some governmental

reasons for that. To get export licenses out of Japan, you have to show some expertise; a certain high quality. So, thus far the Japanese are focusing on their home market. I think it will come as a surprise to a lot of Americans that the Japanese personal-computer market is a one and a half billion dollar market, according to some inputs I have. The U.S. market is about a five and a half billion dollar market.

When did you first use a personal computer?

Kvamme: I first used one seriously when I joined the company. My kids have used them for a while; we've had one at home for about three years. As a matter of fact, I have some theories

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Eighty percent of the numbers in the corporate environment have been in an electronic form.

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about the impact of personal computers on society.

People want to be creative; people don't want to do dull work. When I look at the creativity aspect of things, I think of my youngest son, who is now 16. He didn't particularly like writing. But three years ago he started to use word processing for all his English reports. As is typically the case, a youngster will show up at 9 o'clock the night before the paper's due, and say "how's this look, Dad?" You read it. There are six misspelled words, and you take out the ink eraser, and the paper falls apart.

You allow the mistakes to go through, because you know he's had to handwrite those dozen or 20 pages. The mentality is, oh, it's good enough. But he uses the computer now, so he can change those mis-

spelled words—perfection is within his grasp. I can be an ogre, and say it ought to be perfect. Let's run the spelling checker, which helps him learn to spell better. Now, he's gotten to enjoy writing papers—he can move sentences around, he can move paragraphs around, and have a new copy in minutes. Just before the end of this school year, he was asked to join an honors English class. Unbelievable. And if you ask me why, I'd say that the quality of his work has been aided by this quality tool.

Now, I project that into corporate America—particularly against the image of the Japanese. The work ethic in this country will never become Japanese-like. We are not like them, in many ways; our willingness to go through routine things is much lower than theirs. The net result is that we need tools to be competitive.

What are the most surprising things you've seen since you became involved with personal computers?

Kvamme: This business is full of surprises, because people cause computers to do some of the weirdest things. One area that surprised me is networking. When I came to Apple, I didn't think it had much of a reputation in data communications and networking. But I've been surprised. We have more announced products in networking and data communications than IBM—and we already have users doing all kinds of things.

And the people who use Apples surprise me. A number of film producers use Apples, and so does Henry Singleton, the founder of Teledyne. People have this view of how large corporate America must be, but Henry Singleton wrote all of the programs that they use to manage their stock portfolio on his Apple, himself.

The business started with hobbyists, and so there are a lot of stereotypes. But today, 70 percent of our buyers rate themselves as computer naive. They don't want to program; they just want to use personal computers. And they're doing it. ▟

FURNITURE THAT FITS
cost has to mean low quality," says Tony Lovette, Cargo's marketing specialist. "These are well-made, built-to-last pieces, and I might add that they're selling as fast as we can produce them."

In the low-cost category, you might also shop around in a local computer store, but don't walk in expecting a wide variety of items to choose from. While certain stores carry several pieces, using them to enhance the sale of their personal computers, others shy away from allocating floor space to anything other than systems and peripherals. You might save yourself a trip by phoning each computer store in your area and checking to see which, if any, items it carries.

If you have a larger budget for your furniture needs—say in the $300 to $600 range—you can find an attractive piece of computer furniture that not only satisfies your system housing requirements, but also complements your home or office decor. Suggested sources for these mid-range pieces are both manufacturers and retail stores specializing in computer furniture. Some office supply stores carry a few mid-range items, but the selection is comparatively limited.

Our customers are looking for good, quality furniture, so that's what we stock," says Gary Bragato of Computer Furniture Inc. of Belmont, Calif. "We carry a few items that could qualify as low end, but generally speaking, we leave that kind of furniture for office supply people."

Bragato's customer base is made up largely of professionals like physicians and attorneys, who want a piece of furniture that will look good in the office, and don't mind spending $400 to $500 to get it. With more than 75 manufacturers' designs represented in his showroom, Bragato figures that he's able to offer something for every customer.

Those manufacturers can also be contacted directly for individual sales. FineTech Furniture Inc. of Woodbury, Tenn. is just such a manufacturer, with direct sales to the expanding personal computer user base through ads in major publications.

"We specialize in the middle to upper level of furniture," says Fine-Tech's Jeff Fowler. "We started our business to cater to the needs of people who want to combine style with a piece of functional computer furniture."

FineTech's customers are people who have what Fowler describes as the "personal office." Some are professionals who place a lot of importance on presenting an attractive office; others are home computer users who have made a substantial investment in their systems and are willing to pay for quality furniture to house the machines.

These are also the type of computer users who are often willing to go the extra distance and purchase a beautifully crafted piece of furniture to house their systems. If you're in this category, and can afford to pay $800 to $1500, check out the high-end specialty furniture stores.

Williams & Foltz of Berkeley, Calif., is a leading manufacturer in the high-end furniture line. The firm's top-of-the-line workstation for the IBM Personal Computer sells for $875; its lowest-priced printer table goes for $230. The entire line is handcrafted in oak, and is aimed at the decor-minded individual who wants to combine aesthetics with practicality.

A different market

"There are plenty of manufacturers who mass produce low priced furniture for the mass market, but we're after a different market," says Judd Williams, president of the firm. "We emphasize quality first, and our customers are willing to pay for that quality. Once people spend the money to buy a computer system, then

realize they need furniture to house that system, they're going to spend what they can afford for the pieces they need."

Desks and tables at Williams & Foltz are sold individually, and can be fine-tuned to fit an individual's specific needs. "We design our pieces with modularity and expandability in mind," Williams explains, "but if someone wants something extra and is willing to wait a reasonable period of time for us to get it ready, we're more than willing to do the custom job."

James Proctor of J.K. Products in Sausalito, Calif., is inclined to agree with Williams' customer philosophy. His firm sells strictly high-end furniture—red oak rolltop desks ranging in price from $1595, down to $410. Proctor believes that those who have the money to spend are going to spend it on the best quality furniture available.

"People who are initially turned off by the higher-priced items aren't stopping to think," he maintains. "If you're spending $4000 to $10,000 on a computer, and another several thousand on peripherals and software, why should you balk at investing an extra thousand or so on a quality, secure case for that equipment?" he asks.

Consider security

Proctor's feeling is that although a computer user might purchase a new system every five years, he shouldn't ever have to replace the computer furniture. J.K. Products, like Williams & Foltz, ensures that its furniture will provide long term functionality by building according to a modular design. Expandable shelves can be shuffled around to accommodate added disk drives, or a larger printer, or a detachable keyboard, without altering the basic design of the desk or table. That, he believes, justifies the higher prices.

J.K. Products' line has an added feature that only a handful of other

Professionals want attractive, functional furniture.

furniture lines have included: locked security. With the rolltop desk, an executive in an office building, or a home user, can hide the computer system from sight when it's not in operation.

"When you bring down the top on our desks, no one can tell there's a computer housed in the furniture," Proctor says. "All the components are wired inside the desk casing, so that only one power cord comes out a hole in the back. The top also locks securely, so it would take a great deal of force to open it without a key."

This, Proctor believes, is a deterrent to computer theft, which has become big business among burglars in the past year or so. Today, with millions of personal computers in homes and offices around the world, thieves have found a lucrative alternative to televisions and stereos.

"If a thief sees a computer just sitting there, he's going to take it," Proctor says. "If it's hidden out of sight, it's safe."

He believes that the security features offered by his firm's computer furniture will have an effect on proposed new insurance regulations that would require holders of homeowners and renters policies to take out an extra rider for a personal computer.

"Personal computers are being treated like the CB radios of a few years back," Proctor explains. "Because theft of computers has become so prevalent, insurance companies are going to start excluding the systems from their regular policies. We believe that the insurance companies will cover the computer without any extra charge if they're housed in a secure desk."

So, whether you prefer the low end. the high end, or something in the middle, there's a piece of computer furniture waiting for you. Once you've done your shopping, made your purchase, and set up your system on the new desk or table, you'll wonder how you ever managed without it.

ELECTRONIC SCHOOLHOUSE
proves as easy for them as the Logo turtle is for children, because they can apply knowledge of their own body movement to solve the problem. Sandra Butler, a graduate of the course, says it changed her from computerphobic to computing literate.

Literacy means fear is conquered

The first time Sandra Butler sat down at a computer, the administrator who was going to teach her said: "Well, essentially, you need this code, and then you format, and once you get that, here's the really interesting stuff. Do this assignment—I'll be back in an hour."

Sandra sat in front of the screen, afraid she was going to get a shock, afraid great bells were going to go off, afraid she was going to break it, afraid she wasn't going to get it. She didn't. She couldn't handle the simple little sample letter.

More than a year later, when her boss at the University of the Pacific school of dentistry, Milton, acquired a Hewlett-Packard 125 computer with VisiCalc, she had to do something. Milton went into his office, closed the door, and emerged two weeks later, smiling. Soon he was dazzling the staff with graphic presentations at meetings, and told Sandra she would have to help him with some of the computer work when budget time rolled around. She asked for and received permission to take the Women's Computer Literacy Project course.

The day after her class ended, Milton told Sandra he was going on vacation for two weeks, gave her a blank diskette and keys to his office, and wished her luck. One week later, Sandra emerged smiling. She was ready to do departmental budgets in VisiCalc; she was planning to do research and writing on a computer at home.

And that's what computing literacy is all about.

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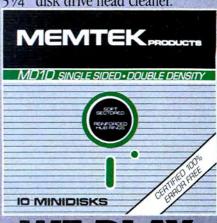
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EFFECTIVE MEETINGS
(continued from page 83)

then access the conference you want to get the latest information," Simard points out.

Information entered in each conference can be public or private. Private notes are addressed to specific individuals, and can only be read by them, while public entries can be read by anyone with access to that conference. Either way, all communications are stored permanently in Notepad's memory, so participants can refer to any item in the system as far back as 1979, when INPO's conferences began.

Another use for the system is for authors of articles or reports to get input on their work before producing the final version. The author enters a draft in the conference and asks for comments, and then various people suggest changes, if necessary.

New technology, new rules

As it makes information exchange easier, Notepad is also changing the way people interact. "Traditionally," says Simard, "your ability to make a point or influence people in a face-to-face meeting has depended somewhat on how well you knew the others, or what kind of visual or vocal impression you made. With Notepad, we have people communicating with people they've never met, people who might not even speak the same language." The established language for the conferences is English. Conferees who don't speak English must translate messages when entering and retrieving them, but since the conferences aren't in real time, the extra time delay doesn't inconvenience any of the other participants.

The large amount of long-distance telephone connect time required for computer conferencing has caused people to question the cost-effectiveness of the technology. But Simard is convinced it's not only the best method for information exchange under such circumstances . . .
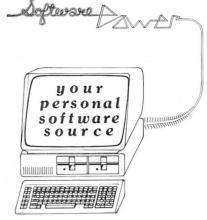
it's the only method. "I actually did a study of how much it cost to transmit a one-page letter over the system," he says. "I typed the letter onto the system myself and assumed it was going to 100 conference participants. I figured that my time to type the letter cost four to eight dollars, and then about 30 to 60 cents per letter to transmit them instantly around the world. Of course, you can also dump text right from a disk onto Notepad, which makes on-line text entry much faster and reduces that cost to about one dollar." At those rates, the conferences are decidedly less expensive than teleconferencing or air travel, and certainly faster than the mail.

User friendly, too

One additional benefit of Notepad is its ease of use. "We wanted a system that was very simple to learn and operate," Simard says, "because there are all kinds of people using it. Sometimes an engineer will enter or retrieve text, and other times a clerical worker in a plant will be assigned to log in and get new information every day. Aside from actually keying-in text, there are only nine actions you can take, and they're all linked to the number keys on the keyboard. If you log in and then hit number three, for example, you can select which conference to enter. Number one lets you write a private note, and at the end you're prompted for the name of the person the note is going to. It's very simple."

When it comes to the connection between personal computers and effective meetings, it's not too difficult to see the potential for improvements in the ways information is prepared, presented, and exchanged in meetings. With the ready availability of graphics, spreadsheet, word processing, data-base management, and communications software, it's virtually certain that personal computers will have a growing impact on business meetings as allies in the battle against waste and inefficiency. ⛏

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CIRCLE 90

"TALK TO ME"

(continued from page 131)

matic order-entry systems, classified ads, warehousing, banking—basically any time you need to use the telephone to pass on data in voice form to people without computer hardware there at their side."

Gilblom is not alone in his predictions about the importance of remote data access. Computalker's telephone controller is designed in part to perform such voice mailbox functions. The demonstration of DECtalk—which anyone can access by phoning (617)493-TALK—tells a listener: "To continue the demonstration, push any number." No matter which number on a touchtone pad is pressed, the synthesizer flawlessly identifies it: "You pressed eight" (or whatever). The capability of accessing data from a remote telephone already exists.

No longer half a loaf

Another major application is in aiding the blind and the vocally handicapped in their daily work and life. "Statistics compiled by the federal government show that about two million people in the United States are severely paralyzed, by cerebral palsy or stroke or some other affliction," observes Russell Thielman, president of Intex. Pamela Lockard, manager of consumer products at Votrax, agrees: "The handicapped is not our biggest market, but it is a growing and steady market. As more visually impaired people become aware of Type-N-Talk from agencies, we see increased sales in that direction." And the Prose 2000 has already been successful in the Kurzweil reading machine for the blind.

One of the researchers exploring talking computers as an aid to the handicapped is John Bryson Eulenberg, director of the artificial language laboratory at Michigan State University in East Lansing. In his work with the blind, Eulenberg

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"TALK TO ME"
has used the Votrax Type-N-Talk or Personal Speech System to develop a number of talking terminal systems for personal computers such as the Apple. One feature that makes word processing possible for blind users is that the voice synthesizer can be set in an "echo" mode to repeat each letter as it is typed, so that the blind person can detect an error as soon as it is made. Then the device can read the entire text back at any desired point. Such capability opens a whole world of work for the blind such as programming and word processing—that until now has been restricted to the sighted.

Then there are the frills and "druthers." "I'd like to have a personal computer that in the morning, as I put on my socks, would tell me the important items for the day," muses Coker. "This is a different kind of communication—in this case enabling you to take in information when your eyes are occupied with something else. When you're doing some routine things, such as shaving or driving, you could be reminded of something you need to do, or briefed on something you need to know. Also, voice output can reach you when you're around the corner or down the hall—such as summoning you when your electronic mail has arrived, or your calculations are finished."

"Perhaps the first place you'll see speech synthesis is at the point of sale in computer stores," Gilblom adds. "If you walk into a computer store, you may often find that the sellers know less than some of the buyers. What a sales tool it might be to let a computer explain itself to you—and sell itself. Software manufacturers have to write things to implement speech—and you may eventually see software that also explains its use."

Whatever the application, it's clear that the future is now. If you're still not sure, just listen to your computer. After all, now it can talk.

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PUNCHING UP PRESENTATIONS

(continued from page 92)

strate the product on a computer."

In addition, Burstein notes, "A lot of people have learned to think with the computer, and it's very hard to work without it. It's just like, every salesman has a pocket calculator, and instinctively when he wants to figure out a price he takes out the calculator. A lot of people are learning to do the same thing with the computer. When you want to start showing things—the effect of what this product will cost compared to this other product and show it over time—or any kind of financial analysis, it's really nice to be able to do it on a computer, and when people learn to do it on a computer they want to take the computer with them. As computers become less expensive, more portable, and easier to carry, this is going to start becoming instinct."

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We said at the beginning that your personal computer is the most powerful tool you have for any presentation you make. By now, our reasoning for making that statement should be clear. A personal database manager and a database service allow you to access huge amounts of data in a matter of minutes. Analytical programs allow you to shape that data into useful information and to play the what-if game at will. Graphics programs allow you to make visual representations of your information in seconds. Word processing and typesetting capabilities let you put together a professional-looking document with little more effort than used to be involved in typing a first draft. A portable computer allows you to take your presentation-tool with you wherever you go. It's true that most of the things that your personal computer can help you with in making a presentation were available in the past. However, your personal computer allows you to do them faster and for less cost.

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The Hayes modem gives you a simple *Repeat* of the last command. Enter another command since you last dialed and you've lost the number.

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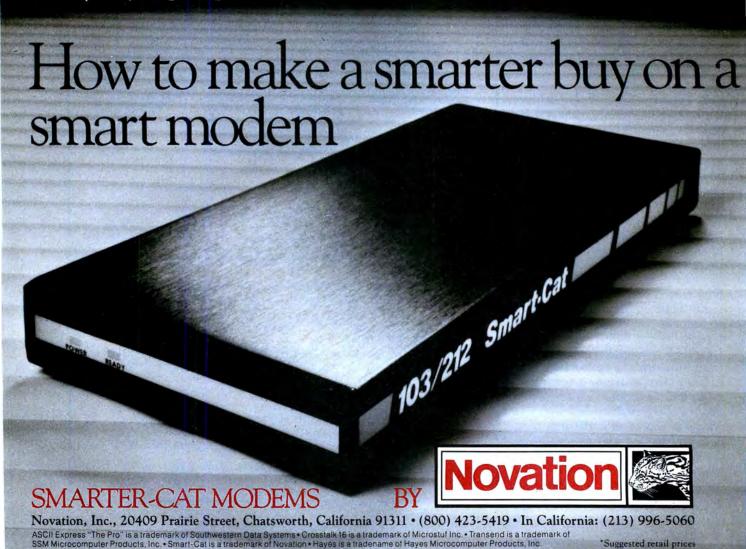
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NEC's PORTABLE PC
SHOWS OFF NEW TECHNOLOGY

NEC has just introduced a power-packed, lap-size portable computer using new RAM disk cartridge technology.

NEC's PC-8201, one of the hottest sellers in Japan, will compete head-to-head with the TRS-80 Model 100 and the Epson HX-20 when introduced at the end of this year. The PC-8201 looks quite similar to the Model 100. In fact, when both computers are placed side-by-side, you have to look closely to see the differences. But despite the resemblance the PC-8201 is unique, and loaded with features that make a difference.

The prime feature of the PC is the RAM disk cartridge, a RAM cartridge that contains its own battery and can be plugged into the PC's system cartridge slot to extend the computer's own RAM. After data has been stored in the cartridge's RAM, the cartridge can be removed from the computer and stored while retaining the information in its memory. The battery will last up to six months, and an AC adapt can keep power flowing to the cartridge when the battery is being changed.

The PC-8201 itself is charged by four AA batteries (AC adapt optional) and uses a large LCD which when powered up, displays a menu listing user options. You can choose from entering the programming mode (BASIC), text mode (TEXT), or telecommunications mode (TELCOM), or entering an existing file.

Selecting the mode or file from the menu is done through the cursor and return key. When the cursor is moved under the mode or file name on the display, the name reverses (white letters on dark background). Pressing the enter key executes the command.

In the BASIC mode, the user can key in programs using N-BASIC (designed by Microsoft) and save the program as a file. The PC-8201 has 63 user files available, stored in on-board memory. Programs can also be stored on an optional cassette or disk. A back-up power feature allows files to be retained in the computer's memory even when the computer is turned off.

The 240 by 64 dot display offers 40 characters per line, with eight lines displayed at a time. The PC-8201 features reverse display, and limited graphics and sound.

The Text mode permits the first-time user to operate the personal computer right out of the box. The Text mode converts the PC-8201 into a mini word processor with the output displayed on the LCD, on hard copy using the printer port (standard Centronics specifications) with an optional printer or stored on cassette or disk.

The Telcom mode converts the PC-8201 into a remote terminal using on-board modem.

The new NEC PC-8201 is a battery operated, lap-size computer. It comes with a word-processing program as standard equipment.

Besides displaying the three operating modes and 21 of the 63 file names (additional file names can be viewed by scrolling the display), the menu also shows the date and time, and labels for the five function keys. These keys have already defined functions, or may be user-defined. You can load, save and list programs, and kill files, for example, by depressing the designated function key. Using the shift key and a function key provides a second capability. When you write your own programs, you can define the labels yourself.

The PC-8201 offers many interfaces as standard equipment. It features a cassette interface, printer interface, RS-232-C interface, and a bar code reader interface. Op-

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CIRCLE 100

tional equipment includes a mini-floppy disk interface, disk drive, CRT adapter (RGB output), a sound coupler, and cables for the printer and RS-232-C interfaces.

Also standard on the PC-8201 are 16k of RAM and 32k of ROM. Both RAM and ROM can be expanded to 64 Kbytes at an NEC authorized service center.

Any battery-operated device always brings concern about how long the battery will last. Without continuous battery power or direct AC line, RAM—including all of the files—will be lost. NEC has addressed this problem in the design of the PC-8201.

The length of time the batteries will power the computer depends upon the type of batteries used and whether or not the memory protection switch is on. According to NEC, alkali batteries will power the PC for more than 18 hours, compared to a standard battery lasting six hours and a nickel-cadmium battery for five and one-half hours.

The memory protection switch (which NEC calls the battery discharge prevention switch) supplies power to the RAM when the computer is turned off. If you don't want to retain the files in RAM, you can turn the memory protection switch off. This will save the battery and erase the RAM.

Another battery-saving feature built into the PC-8201 is the Automatic Power Off function. If you should leave the PC on for ten minutes without pressing a key, the Automatic Power Off function will turn off the computer for you.

When the batteries begin to lose power, an LED on the face of the computer will activate, reminding you that it's time to change the batteries. To save your files stored in RAM when changing the computer's batteries, you must use the AC adapter to supply temporary power.

The PC-8201 lays flat on a desk or in your lap. As with many LCD computers, the reflection of ambient light can give the appearance that the display is disappearing or has vanished. In an attempt to ease this condition, the PC-8201 lets the user adjust the contrast of the display. You can view the display at practically any angle.

Both upper- and lowercase letters are standard on the PC-8201. The computer can be switched from lowercase to uppercase mode by pressing the shift key for single letter caps or by pressing and locking the Caps key. The Caps key permits the user to continue to type in upper case without using the shift key.

Graphic symbols can be input into the PC-8201 by using the graphics key. Only three ordinary keys (X, Y, and C) have been set with graphics symbols—however it's possible to define up to 61 different graphics symbols when programming.

NEC is expected to provide a broad base of software support for the PC-8201. They have indicated that, at first, the software will be available on cassette, and on

ROM chips which must be installed by their service centers. Later on, disk software will be available.

The PC-8201 is not without faults. One of the major drawbacks involves the RAM cartridge. Although the cartridge will retain memory for up to six months, the user must keep track of the time himself. There is no mechanism (such as an LED warning light) to let the user know the battery is running low. Another potential difficulty concerns the software expected to be available on ROM. Each ROM software package must be installed at an NEC service center. This can be time-consuming, and might leave a user without his computer for a day or so while the ROM is being installed.

The NEC PC-8201 is bound to be a strong new portable entry. And if NEC's future plans for this model develop as they expect, you'll be seeing valuable, on-board software that will make the competitively priced PC-8201 a computer worth serious consideration.

FOR MORE INFORMATION: NEC HOME ELECTRONICS INC., 1401 Estes Ave., Elk Grove Village, IL 10007-5463; (312) 228-5900. CIRCLE 551

—*Jim Keogh, Associate Editor*

MORE POWER FOR THE IBM PERSONAL COMPUTER

Amdek, a suburban Chicago-based corporation pursuing the peripheral market for the IBM Personal Computer, will begin distribution this fall of its new four-in-one Multiple-Adapter Interface Board.

The board puts multiple graphics and printing functions in one slot, adding a total of 128k RAM to the computer. You can select the amount of RAM you want dedicated to different functions with a DIP switch on the board. You can also choose monochrome or color monitor operation. The board has a print spooler and a parallel interface, which allows the user to operate the computer while printing out other material.

According to Amdek spokesmen, MAI's light pen (which is included with the board) offers resolution 16 times sharper than that of the IBM color graphics interface. A high-density memory allows up to eight pages of graphics storage, so the computer can store more data with better picture enhancement than comparable IBM boards. In addition, the board contains a UV-erasable EPROM for easy modification of the character set for special applications or languages, and excellent color graphics enhanced up to 640 horizontal by 400 vertical resolution with four colors, and 320 by 400 with 16 colors.

The user can select several different graphics modes, either through the graphics software package that comes with the board, or on the board itself. A graphics library containing sets of instructions permits the user to access such modes as hatching, interlace, or "dithered" colors in

programmer's
READ THIS...

```
10   REM PROGRAM FOR WRITING/SELLING YOUR PROGRAMS AND IDEAS
15   REM TO SOFTWARE PUBLISHERS, GAME COMPANIES, OEM'S, ETC.
20   S = $ALEABILITY: O = ORIGINALITY: C = CREATIVITY: GD = GOOD
     DOCUMENTATION
30   E = ENTHUSIASM: P = PERSEVERANCE
40   PGM = PROGRAM: ENV = ENVELOPE: T = TODAY
50   IF  E  =  P  THEN  GOSUB  80:  REM  SOFTWARE  COMPANIES  ARE
     SEARCHING FOR GOOD PROGRAMS
60   FOR  X  =  1  TO 10: REM READ CHAPTER ON "THE X FACTOR = 10
     STEPS TO WRITING A $UCCE$$FUL PROGRAM"
70   S = X + O + C + GD: NEXT X : REM DON'T CONFUSE X WITH S or
     O or C or GD. X = 10 ADDITIONAL FACTORS
80   GET $OFTWARE WRITER'S HANDBOOK
90   PEEK $OFTWARE WRITER'S HANDBOOK: REM FOR IMPORTANT GUIDANCE
     ON WHAT PROGRAMS THE COMPUTER COMPANIES/PUBLISHERS WANT
100  PEEK $OFTWARE WRITER'S HANDBOOK: REM FOR DETAILS ON HOW  TO
     WRITE A $UCCE$$FUL PROGRAM
110  WRITE PROGRAM
120  DEBUG PROGRAM:  REM  READ HANDBOOK CHAPTER "HOW TO DEBUG"
130  PEEK SOFTWARE WRITER'S HANDBOOK: REM READ HANDBOOK CHAPTER
     "HOW TO WRITE CLEAR DOCUMENTATION"
140  WRITE DOCUMENTATION: REM CLEAR DOCUMENTATION IS THE FIRST
     THING PUBLISHER'S LOOK FOR.
150  PEEK $OFTWARE WRITER'S HANDBOOK:  REM  FOR  THE  NAMES  AND
     ADDRESSES OF THE RIGHT PUBLISHERS FOR YOUR TYPE OF PROGRAM
160  POKE PGM + ENV: REM PUT PROGRAM IN ENVELOPE AND MAIL IT  TO
     THE RIGHT PUBLISHERS
170  RETURN: REM RETURN  TO  HANDBOOK  REPEATEDLY  FOR  IDEAS  +
     INFORMATION ON THE WHO/HOW/WHAT OF SELLING YOUR PROGRAMS
180  READ Q: POKE Q + ENV + T: REM FILL IN THE DATA AND SEND FOR
     YOUR COPY OF THE "$OFTWARE WRITER'S HANDBOOK"
190  DATA SEND CHECK OR MONEY ORDER FOR $19.95
200  DATA SORRY, NO C.O.D.'S
210  DATA MAIL TO: SOFTWARE WRITER'S GUILD
220  DATA          P.O. BOX 87
230  DATA          STONY POINT, NEW YORK 10980
240  DATA          (914) 354-5462
250  DATA INCLUDE YOUR NAME, ADDRESS, PHONE #
260  END: REM ACTUALLY A VERY $MART BEGINNING
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CIRCLE 101

(continued from page 216)

high resolution. (Dithered colors are made when the computer alternates different kinds of colors as it "draws," so that they appear to be a separate color entirely.)

This product is comparable to the separate cards produced by IBM, but at its current price of $599, it's less expensive. In a color mode, for example, you'd need to buy a separate graphics board, a printer, and RAM card for about $200 more to equal most of the MAI board's capabilities—and that wouldn't include the software or print spooler. Even then you'd only have one slot left in your computer for other cards (assuming you were using a disk controller). In a monochrome mode, you'd have two slots left, but you'd also need to buy both a black and white parallel board and a RAM board to equal the MAI. Other print spoolers can often run $300 to $400 dollars. Since IBM does have a software spooler on DOS 2.0, Amdek people assert that their hardware print spooler is more transparent and thus more convenient to use.

One Amdek sales manager said: "People who buy this board will go after the graphics and printing capability. Only after they bring it home will they know what it can really do."

FOR MORE INFORMATION: Amdek Corporation, 2201 Lively Blvd., Elk Grove Village, Il 60007; (312) 364-1180.
CIRCLE 552
—Arielle Emmett, Associate Editor

HARD DISK NETWORK

Davong Systems has announced Multilink, a local area network which allows up to 255 Personal Computer or XT users to share a hard disk system.

Multilink provides shared hard-disk storage without requiring hard disks at every workstation. Users can enter or extract information from a common data base, use large programs, and exchange communications.

Davong System's new LAN is based on ARCNET levels 1 and 2, and is compatible with higher level Xerox Network Systems protocols. Multilink uses token passing. High-level protocols are also expected to be compatible with all approaches accepted by the IEEE-802 standards committee. A conventional coaxial cable links nodes on the network.

Maximum distance between any two stations in the network is 20,000 feet. Each remote computer must be attached to a hub device. Maximum distance between a hub and remote computer is 2000 feet.

The retail price for each interface card is $595, and a passive 4-connector hub is $100. An active 8-connector hub is $800.

FOR MORE INFORMATION: DAVONG SYSTEMS, 217 Humboldt Ct., Sunnyvale, CA 94086; (408) 734-4900.
CIRCLE 553

Mini
Flexible Disc 2d

Memorex® Reliability.
Now You Can Trust It
Even Longer...For Years.

Memorex's new 5 year warranty on our flexible discs gives you more protection and value—at no extra cost. It's what you've come to expect from the leader of computer media products for the past 22 years.

Memorex's "Is It Live or Is It Memorex?" means quality. Quality that makes Memorex the first choice of millions of computer customers. Quality that keeps Memorex discs working flawlessly on personal and business computers—like Atari, Apple, Commodore, IBM, Osborne, Radio Shack (TRS-80) and most others.

Your computer data is critically important to you—and to us. Use the flexible disc you can trust longer. Use Memorex. See your dealer or distributor today. Or call (800) 538-8200 for the one near you.

MEMOREX

A Burroughs Company

ANNOUNCING
THE ACCELERATOR II ™

Make your Apple® II run 3.6 times faster with VisiCalc®,
DB Master®, Applesoft, Apple Fortran, Pascal, and much more!
Eliminate those long delays in recalculating VisiCalc models, etc.
Just plug in the Accelerator II, and make your Apple
one of the most powerful microcomputers available.

The Accelerator II: Based on a fast 6502 processor with 64K of high-speed memory. Includes built-in fast Language card. Hardware compatible with all standard peripherals. Transparent operation with Apple II software. Special pre-boot diskette included to run Applesoft, PASCAL, and Integer Basic from high-speed RAM. Suggested retail price: $599.

SATURN SYSTEMS INC.

P.O. Box 8050
Ann Arbor, Michigan 48107
(313) 973-8422

40-COLUMN PRINTER
WITH GRAPHICS

Alphacom Inc. introduces the Alphacom 42, a 40-column printer with graphics retailing for $179.95. The Alphacom 42 prints two lines per second and combines a single-chip microprocessor with an Olivetti print mechanism using advanced thermal technology.

The Alphacom 42 printer features upper- and lowercase letters, and a wraparound capability that can print text lines longer than 40 characters. It recognizes standard ASCII control for changing the printing mode. Codes include carriage return, line feed, right justification, form feed, graphics control, and multiline feed.

Alphacom 42 is compatible with the Atari and TI home computers, and with the Commodore VIC-20 and 64.

FOR MORE INFORMATION: ALPHACOM INC., 2323 South Bascom Ave., Campbell, CA 95008; (408) 559-8000.
CIRCLE 554

The Alphacom 42 is a thermal printer which uses a single chip processor and is compatible with several computers.

A FULL CAST OF STAR PERFORMERS

The Esprit product line has the right performer for every terminal role. It begins with *Esprit I,* an editing terminal at a conversational price. This basic Esprit presents crisp, clear video in comfortable green phosphor on a 12" diagonal screen. The integral typewriter keyboard has a 14-key numeric pad with alternate function key modes. *Esprit II* delivers additional editing features, plus the convenience of a detached keyboard; enhancements you'll appreciate in data entry. *Esprit III* meets a wide range of terminal applications. It costs much less than a TVI 925, but gives a significantly stronger performance including line drawing graphics, a broad repertoire of video attributes and editing commands, 22 user definable function keys and an optional 4-page display memory. *Esprit III COLOR* delivers the full Esprit III performance in eight brilliant colors.

There's an Esprit that's ready to star in all your terminal roles. Auditions are being held by your Esprit dealer right now.

Esprit Systems, Inc., Hazeltine Terminals Division, 100 Marcus Drive, Melville, NY 11747 (516) 293-5600

Esprit Systems, Inc.
Hazeltine Terminals Division

SMALL-BUSINESS HARDWARE
AND SOFTWARE SYSTEM

Morrow Designs has developed a hardware and software system designed to provide everything a small business needs to computerize its bookkeeping.
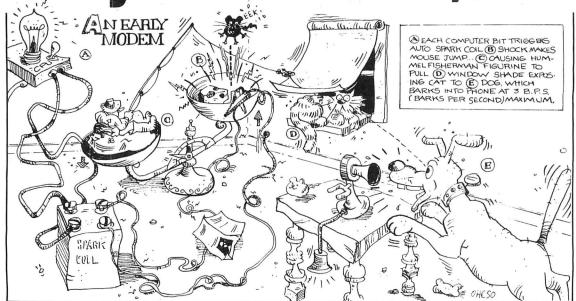
The system is built around the MD3 Business Computer, an 8-bit computer with 64k RAM, and two drives for double-sided 5¼-inch floppy disks. The terminal is full-featured, with seven programmable function keys, seven dedicated function keys, and a numeric keypad. The monitor has a 12-inch, 80-column screen.

The Quest Bookkeeper System is among the software included with the MD3. Quest is designed to require little training to operate, and handles accounts receivable, cash disbursements, and general ledger. Quest has HELP messages to guide users through bookkeeping; once the messages are no longer needed, they may be deleted. Each accounting function can be used independently or in combination with other functions. Accounts receivable is divided into three parts: sales posting and journal, accounts receivable reporting, and cash receipts posting and journal. Users can post customer invoices to the system and distribute them to general ledger sales accounts. Quest generates reports on customer balances, past-due amounts, and level of business with a particular customer. A check-writing feature, cash disbursements journal, and vendor listing are also included with the bookkeeping system. Combining these functions lets users distribute vendor invoices and receive detailed reports on all checks written.

Seven other software packages come with the MD3 Business Computer: CP/M 2.2 operating system, WordStar word processing, MicroSoft Basic-80, BaZic—a NorthStar version of BASIC, LogiCalc financial spreadsheet, Correct-It spelling checker, and Personal PEARL data-base manager. LogiCalc is an enhanced version of

After you ask what it can do for you now, ask what it can do for you later.

The HP-86
Personal Computer.

If you're about to buy a personal computer, you need to consider two basic issues: What your needs are now, and what they're likely to be a few years from now.

That's why the HP-86 has to be your best choice. It's got the software and the hardware to go the distance.

Dow Jones/News Retrieval Service, or a number of other nationwide information sources. When the time comes for more, consult our 450-page software catalog. Chances are, you'll find what you're looking for.

Software for today and tomorrow.

Save $255* on the Personal Productivity Pac. Here's a good way to get started. With software that, if bought separately, would cost you $750** We're offering it at the reduced price of $495.** You'll get VisiCalc® PLUS, the world-famous electronic spreadsheet for "what-if" planning. (The "PLUS" is a Hewlett-Packard bonus: extra programs to quickly turn your spreadsheet into bar graphs, line graphs, or pie charts.) Plus WORD/80, for word processing. And FILE/80, for record keeping without paperwork.

CP/M.® Buy this plug-in module, and you'll extend your HP-86 system to accept many popular programs written under the CP/M operating system — programs such as WordStar™ and dBASE II.™

Graphics Presentations. When combined with the HP 7470A plotter, our graphics software lets you produce professional-quality pie and bar charts, line graphs, text pages, and overhead transparencies. And you can do it all in color.

Data Communications. If you decide you want it, an optional accessory lets you access The Source, the

Hardware that expands with your needs.

While your computer's ability to expand depends largely on software, naturally, the hardware must keep up. That's why the HP-86 system has a modular design. So you can add a printer or plotter as easily as you hook up a tape deck to your stereo. And operate up to 14 peripherals at once, if you wish.

When you find yourself facing lengthy problems or spreadsheet analyses, simply add more memory — up to 640K bytes.

As you demand more of your HP-86, you'll find that it keeps up. Whether you need a broad range of hardware, software, or peripherals, the HP-86 makes expansion easy, giving you a hard-working system tailored to help solve your specific problems.

If you need more good news, try this: The basic system is only $2820 ** (128K computer/keyboard, 12" monitor and single 3½" disc drive).

Get a hands-on demonstration of the system that works for you now, and will still be working for you later.

For the authorized HP dealer or HP sales office nearest you, call TOLL-FREE 800-547-3400 and ask for operator 102. M-F, 6 a.m.-6 p.m. PST.

Personal computers & calculators for professionals on the move.

hp **HEWLETT PACKARD**

CIRCLE 113

I don't think you can buy a better accounting package. I <u>know</u> you can't buy a cheaper one.

I'm Irwin Taranto. For the past five years, I've been developing my accounting systems, and they've gained a bit of reputation.

Now they're ready for almost any small computer: IBM PC and compatible machines, CP/M machines and the TRS-80. General Ledger, Accounts Payable, Accounts Receivable (Open Item or Balance Forward), Payroll/Job Costing and Inventory Control. Five interactive systems that handle the accounting for thousands of small businesses throughout the world. I also offer a Personal Accounting System.

Critical acclaim One magazine said my systems were "an impressive product at a very reasonable price." And that was when they cost three to four times as much as they do now.

Another magazine, in a general review of accounting systems, said that among all manufacturers, only Taranto and one other were "noted for their support."

Personal support The magazine didn't exaggerate. I think I offer the best support in the microcomputer industry. When you buy my systems, you also buy a phone number. If you have a problem, call and we'll fix it. If the problem's tough enough, I'll get on the phone and straighten it out myself.

A rock-bottom price I sell these systems for $99 each. You can buy the full interactive set for less than $500.

You might wonder how anything priced so low can be taken seriously. The answers are simple. I've sold thousands of these systems, and I paid off my development costs a couple of years ago. Also, I'm selling to you direct. I can bring the price down so low no other serious software can compete.

A free trial No software is worth buying until you've seen it work. So when you buy my systems, you get a demo disk wrapped separately from the actual software. Take out the demo, try it and get comfortable with it. Then, when you decide it's a good deal, unwrap the real disk and go ahead. If you're not happy with the demo for any reason at all, just pack up the unopened disk and send it back to me within 30 days. I'll refund the full $99.

But I'll be surprised. If there's anything better in the market, I haven't seen it yet.

Simple ordering Just call and tell us what you need. We'll ask you a couple of questions about your equipment and handle the whole transaction in one phone call.

Toll free: (800) 227-2868.
In California: (415) 472-2670.

Taranto
& ASSOCIATES, INC.

CIRCLE 116

Post Office Box 6216, 121 Paul Drive, San Rafael CA 94903.

Introducing the most powerful, multi-user micro for your money, North Star's HORIZON® 8/16.

If you're looking for a powerful, multi-user microcomputer that outperforms everything in its class, take a close look at the North Star HORIZON 8/16. It handles up to eight individual users. Supports both 8-bit and 16-bit applications simultaneously. And processes information faster than any comparably priced multi-user micro available today.

Advanced multi-processor architecture makes this powerful performance possible. Unlike other multi-user systems, the HORIZON 8/16 doesn't load up its users on a single processor; instead, it provides a dedicated processor for each individual user — at a cost no greater than that of conventional shared processor multi-user systems.

The result? Increased productivity because there's no slowdown in processing performance — even when there are eight users on the system.

Best of all, the HORIZON 8/16 features an ingenious plug-in modular design. When you need more users, simply plug them in. This built-in flexibility lets you choose your options and tailor the system to meet your growing needs.

What's more, the new North Star TurboDOS® is many times faster than standard, multi-user operating systems — and is compatible with thousands of today's most popular business software applications. As for reliability, over 30,000 HORIZONs are in use today.

The HORIZON 8/16 outperforms every micro in its class. Costs no more. And is the only multi-user micro designed to meet your needs for today, and tomorrow — simply by plugging in the options you select.

You can discover North Star's HORIZON 8/16 at more than 1,000 computer stores and system houses nationwide. Call 800-722-STAR for the location nearest you. Or write North Star Computers, Inc., 14440 Catalina Street, San Leandro, CA 94577.

NorthStar™
Simply powerful solutions.

(continued from page 228)

CalcStar; it features linear regression which lets it add numbers on screen and enter them into the spreadsheet, as well as extend figures into the future based on current trends.

The MD3 Business Computer and included software is priced at $2495.

FOR MORE INFORMATION: MORROW DESIGNS INC., 600 McCormick Ave., San Leandro, CA 94577; (415) 430-1970. CIRCLE 555

TWO BRIEFCASE-STYLE SYSTEMS

S KS Computers has developed two leather-briefcase-style, fully modularized 8- /16-bit portable computers called the SKS 2502 Nano and the SKS 252 Pico.

The SKS 2502 Nano is a desktop-compatible unit with an 8-bit configuration and two 5¼-inch 400k disk drives. It has 80k of RAM, a built-in CRT, and a separate keyboard controller. There are two RS-232-C serial ports for printer/modem connections.

The SKS 2505 Nano is a portable computer that comes with two 5½-inch disk drives and two RS-232-C serial ports.

Software packages included with the 2502 Nano are the CP/M operating system, Modified CBASIC, Perfect Writer, Perfect Filer, Perfect Speller, Perfect Calc, and Menu Runtime.

The base price for the SKS 2502 Nano is $2495. The dual 8- /16-bit Nano with 80186 processor lists for $3295.

The SKS 252 Pico is similar to, but smaller than, the SKS 2502 Nano. It uses the same keyboard, and 8- /16-bit CPU with 80 to 128k of RAM, and the same CRT. It has two 5½-inch 200k disk drives instead of the Nano's 5¼-inch drives. The 252 Pico weighs 22 pounds and sells for $2595.

FOR MORE INFORMATION: SKS COMPUTERS INC., 4091 Leap Rd., Hilliard, OH 43026; (614) 876-8668.
CIRCLE 556

MICROMAIL™

DATACON INTRODUCES INVISIBLE SOFTWARE

HARDWARE OF THE MONTH

10MBYTE WINCHESTER IN 5¼-INCH FORMAT

Digital Equipment Corporation introduces a 5¼-inch, 10Mbyte Winchester disk drive for small business and personal-computer systems. The new drive, the second member of Digital's line of 5¼-inch Winchester products, is called the RD51. It interfaces with the Professional 350 personal computer.

The RD51 mounts in the computer's system package, and has 345 tracks per inch with a density of 9074 bpi, and a peak data transfer rate of 5M bps. The drive has an average access time of 85 milliseconds, and a rotational latency of 8.33 milliseconds. It has 1224 tracks with 16 sectors each.

The disk drive itself is priced at $1695. Pricing for the complete subsystem with a controller depends on the system package.

FOR MORE INFORMATION: DIGITAL EQUIPMENT CORPORATION, Maynard, MA 01754; (617) 264-1669.
CIRCLE 557

SYSTEM WILL ACCEPT 8-BIT OR 16-BIT SOFTWARE WITH AN ADD-ON CIRCUIT BOARD

NEC Home Electronics has announced its PC-8800 personal-computer system, which comes bundled with popular software and will accept 8- or 16-bit programs when a circuit board is snapped into place inside the unit's housing.

The PC-8800 has 64k of RAM, a 5¼-inch dual disk drive, and a 12-inch green-phosphor monitor. The keyboard is detachable, and it has a numeric keypad with five user-programmable function keys. Serial and parallel ports are built in. The 8800 also has built-in disk drives, and cassette and monitor interfaces.

The software-bundled price is $2497. It includes Word-Star and MailMerge from MicroPro, and the MultiPlan spreadsheet from Microsoft. BASIC languages N80 and N88 are built into the system.

FOR MORE INFORMATION: NEC HOME ELECTRONICS INC., 1401 Estes Ave., Elk Grove Village, IL 60007.
CIRCLE 558

Quark introduces

A deceptively simple solution to your word processing dilemma.

If you're serious about word processing on your Apple*IIe, you may be bewildered by the sheer number of programs available. And a tad perplexed by their claims and promises. After all, a glamorous package that says "easy to use," may not even be easy to open.

The dilemma is real. And Quark is happy to provide the solution.

A proven program for serious word processing.

Quark's new Word Juggler IIe turns your computer into a dedicated word processor. You get the extraordinary ease of use, sophisticated capabilities and straightforward documentation that make our original Word Juggler a best seller on the Apple III.

For example, there's virtually nothing to memorize. Because principal editing functions are identified on a unique keyboard template

— and nineteen, easy-to-install, replacement keycaps.
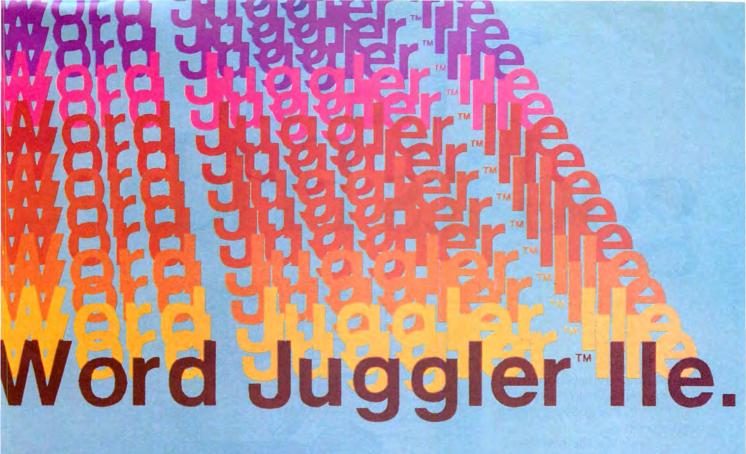
Changing keys is quick and simple, too. Just slide our special keycap remover over the key — twist — and pull. Your new keycaps can be in place in less than two minutes.

A flexible tool to increase your productivity.

But don't be deceived by Word Juggler IIe's disarming simplicity. The program packs the powerful features you need to quickly perform the most complex editing tasks.

Characters, words, even entire paragraphs can be deleted with a single keystroke. There are search and replace keys. Block move and copy keys. And you always have instant control over page length, margins and any other formatting parameters.

Document display and print out are easy, also. One keystroke displays your document on the screen. Another prints it. And whether

Word Juggler™ IIe.

you need to print only specific pages, multiple copies, or even documents too large to fit in memory, Word Juggler IIe can easily accommodate you.

A clever way to foil Mr. Murphy.

Even the best of us occasionally forgets when "i" does <u>not</u> come before "e" — and even the most agile fingers can press the wrong key. So you should also give serious consideration to Quark's new Lexicheck™ IIe — a spelling checker with a highly compressed, 50,000 word dictionary.

Accessed from within the word processor, this program lets you virtually eliminate typographical errors and common misspellings. Lexicheck IIe will scan your document at up to 8,000 wpm — then highlight, in context, the first occurrence of any word it does not recognize.

If the word is correct, as in the case of industry jargon or abbreviations, you can simply add it to your personal dictionary. If the word is actually misspelled, you can swiftly correct it.

A lot more.

These are only some of the ways Word Juggler IIe and Lexicheck IIe can help solve your word processing dilemma. Your Quark dealer has even more details, as well as complete information on our line of office automation tools for the Apple III.

Ask for a demonstration today.

Quark™
INCORPORATED
Office Automation Tools
2525 West Evans Avenue
Suite 220
Denver, CO 80219   CIRCLE 116

Word Juggler IIe $239. sug. U.S. retail price
Lexicheck IIe $129. sug. U.S. retail price

Thank god it's Friday!™

Business at Bundt-weiller Brass Beds is booming! And now that Friday!'s here to help out, I've got everything under control.

Friday!'s the revolutionary new microcomputer information management system from Ashton-Tate, the people who invented dBASE II®

It came in Tuesday, and it took me almost no time at all to get the hang of it because Friday! works *with* me, not against me. I've already turned stacks and stacks of paper files into much more efficient "electronic files." And it's so easy to use that even Mr. Bundtweiller can do it.

So now, no matter what Mr. Bundtweiller needs to know—no matter when he needs it—he or I can find it in seconds.

The names and commissions earned by our top 25 salespersons since January 1st.

The total number of #3455 Brass Beds sold year-to-date, by region.
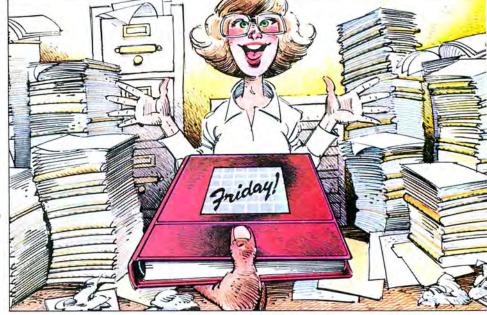
A quick report on our cash receivables.

Or the special report for the Board of Directors meeting this afternoon. Mr. Bundtweiller forgot to tell me about it until just before lunch, but Friday! and I got it done in no time at all. It looks gorgeous!

Friday! even knows how to keep private or confidential information to itself unless I ask for it using a special password.

Friday!'s helped me say goodbye to paper shuffling forever. It's terrific for inventory and invoices and paychecks and input screens and reports. It works with dBASE II® and 1-2-3[1] and WordStar[2] files. And the way it handles mailing lists and labels is just fantastic.

All for just $295 (suggested retail price). It's worth it for the mailing lists alone.

So if you need some good, reliable help to handle just about everything that needs handling around your office, for my money it's Friday! any day of the week.

For the name and location of the Friday! dealer nearest you, contact Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230.

Or better yet, just call (213) 204-5570 today and find out why so many people are saying: T.G.I.F.

Friday!™

ASHTON·TATE ▪

New Software For
Improved Business Efficiency

Each month Personal Computing *scans the software market to keep you up to date on everything that's new. Those products we consider to be most useful and exciting in this month's crop are described in this section and commended for your closer examination. Others are listed in Showcase of Products, our special subscriber section.*
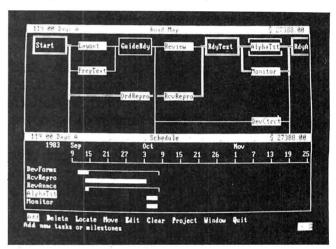
A CRITICAL PATH PLANNING TOOL FOR PROJECTS OF ALL SIZES

Government contractors and major builders have long known the value of CPM (Critical Path Method) and PERT (Project Evaluation and Review Technique) as planning tools in major projects. These techniques—which allow the project manager to graphically illustrate the substeps and critical points necessary in order to reach the final project goal on time and under budget—have, until recently, also required a great deal of effort, including a lot of time spent scratching estimates on paper, and, in most cases, meant hiring a draftsman to produce the CPM charts. As a result, these methods have been applied to only a few select types of projects, but with a new package from Harvard Software, Inc., that may change.

Harvard Project Manager, the new project-management package for the IBM Personal Computer, is the impressive first release from Harvard Software, Inc. The company hopes that by making CPM and PERT easy to use, these methods can be extended to help both managers and professionals responsible for projects of all types and sizes, in any field.

The use of graphics to illustrate the critical milestones and subtasks of a project is inherent to critical path planning. Thus, the Harvard Project Manager makes heavy use of graphic displays to illustrate your project, but it doesn't require a a graphics adaptor or any other graphics hardware. Instead, it creates graphic images by exploiting the extensive character set of the IBM Personal Computer. These images include a project "roadmap" which shows milestone dates and their component tasks, and a bar chart showing when each task begins and ends, with task durations specified in time units ranging from minutes to years.

The program also makes impressive use of a split-screen display technique. For instance, you can make on-screen structural modifications to the project roadmap or change task durations, while simultaneously monitoring the impact of those changes on the project schedule. You can also scroll the display window horizontally or vertically to examine large project roadmaps or schedules that cannot be displayed in one screen of text. High-resolution hard copy of any of the graphic displays can be generated on a dot-matrix printer.

Harvard Project Manager has a unique split screen feature. Here the project "Road Map" is displayed above the schedule.

An important feature of the program is that while setting up your schedule, you can distinguish between projects that will take the same time to complete regardless of the number of nonworking days in the schedule, and those which can only progress on working days. For example: On a landscaping project, the 10 days allocated to preparing the soil would have to be working days, but the three months allocated for ground cover to become well-rooted would not change, regardless of the number of holidays or weekends in that period.

Harvard Project Manager can also help managers keep track of project finances as well as timing. The cost of each project task is entered along with its scheduling information. If the project definition or duration is redefined, the program automatically recalculates and displays the new total cost.

Ease of use was obviously a major concern of the program's authors. They've made data entry very simple, and you are free to change any data item at any time.

The Harvard Project Manager package is supplied with a substantial two-part user's guide. The first part consists of a tutorial on project management, explaining

LISTM

For the small business owner, school official, club officer, household manager, busy professional — or any active, independent person with a lot to juggle and sort — the ListMaker™ software package is the easiest, most economical way to do the sorting. And eliminate the juggling.

ListMaker information management system will pay for itself by helping you keep on top of your job, your clients, customers or patients. And it will make household, club or school management more efficient than you ever thought possible.
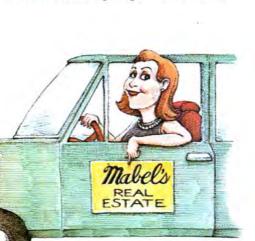
Whether it's listings, labels or letters; names, dates or zip codes; new business prospects, health information or whose engine needs an annual check-up — ListMaker is easy to use and very flexible. It will eliminate all your files and dreary paperwork and leave you more time to be creative and productive.
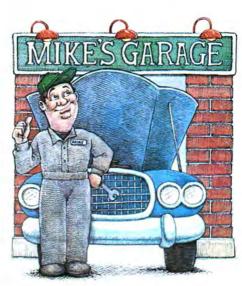
ListMaker lets you compile information in three different ways: the list file which creates the format you'll need; the data file which stores your list information; and the print file which organizes the data file into the form you want.
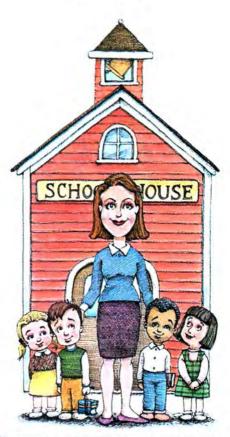
ListMaker also sorts and searches for records according to your own specific needs. And the merge-print operation can automatically insert the proper information into your ListMaker form letters.

The how-to's of ListMaker are easy, too. The user's manual is comprehensive, clear and simple to follow step-by-step.

Reader's Digest, the creators of ListMaker, has specialized in information and list management for years. And they've condensed their know-how into this capable program.

SOFTWARE FOR THE

"What more can I do?"

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Introduction to WordStar™ by Arthur Naiman ($11.95) An indispensable finger-tip guide recommended for beginners as well as experienced users. It teaches you, step-by-step, how to edit copy, create and merge files, even design special print effects.

Your First BASIC Program by Rodnay Zaks ($9.95) At last, a book designed for the first-time computer user who wants to learn how to program. It is simply written, educational, beautifully illustrated and fun to read.

The Easy Guide to Your Apple II® by Joseph Kascmer ($9.95) Never before has getting started with your computer been so easy! Each practical operation that you can perform with your Apple computer — word processing, mathematical calculations, budgeting, filing and more — is explained here in simple terms.

Mastering VisiCalc® by Douglas Hergert ($11.95) Tells you how to get the most from your "electronic spreadsheet," for tasks ranging from planning to examining projection scenarios.

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SYBEX COMPUTER BOOKS

CIRCLE 126

CPM and PERT concepts and how to use them with the program. The second part of the manual is a reference guide that provides more detailed information about the program's features.

This program makes the CPM and PERT techniques much more convenient and easier to use than they have ever been before. Harvard Project Manager may be to critical path planning what VisiCalc has become to spreadsheets.

Harvard Project Manager runs on the IBM Personal Computer and compatible computers under the PC-DOS (MS-DOS) operating system. It will be available September at a suggested retail price of $395.

FOR MORE INFORMATION: HARVARD SOFTWARE, INC., Harvard, MA, 01451; (617) 456-3400.
CIRCLE 560

"NEW GENERATION" WORD-PROCESSING SOFTWARE FOR THE IBM PERSONAL COMPUTER

At a press conference held in Boston, Mass., Leading Edge Products announced their latest offering—the Leading Edge Word Processor, slated by the company as a "new generation" of word-processing software for the IBM Personal Computer. According to the company, this package will give the IBM capability that matches or exceeds that of a dedicated word processor.

The demonstration of the product was indeed impressive. A camera pointed at the keyboard and screen of the IBM Personal Computer, and floor-to-ceiling screens gave the conference attendees an over-the-shoulder look at the product's capabilities.

Starting off with cursor movement and control, the demonstration showed how the cursor can be used to move to a previous or next word, line, sentence, screen, or page, as well as to the beginning or end of the document. The user can also go to any page in the text by using a "Goto" command. For example, "Goto page 6," will bring the user to the top of page 6. Because most word-processing time is spent entering and revising text, the company says, cursor control features promote speed, flexibility, and accuracy.

An example of this flexibility is in the program's ability to "cut and paste." The user can move text around anywhere within a document and if he is not sure of where he wants it right away, the software can save it until he decides.

When cutting, pasting, copying, replacing or emphasizing text, the package allows the user the option of highlighting. He can do this in one or more of seven available colors. The software moves the cursor; all the user has to do is tell it where to stop by directing it north, south, east, or west on the screen.

According to the company, this package is faster and easier to learn and use because of the natural relationship between what needs to be done and doing it. It's both an efficient and faster system because its commands are compressed into fewer keystrokes. It makes full use of the IBM function keys, eliminating the need for "programming" to format and edit text, they continued.

Another interesting feature of the Leading Edge Word Processor is its ability to restore text that has been deleted. If, for example, the user employs the overstrike feature of the package and just types over what he has already entered, and then changes his mind, the software has the capability to restore all of the text as it was originally input. This is also true of text that has been deleted on purpose or by mistake.

One of the special features of the package is split screens which allow the user to quickly review more than one document on the same screen. This can be extremely helpful if you're preparing large documents with several different files or parts. Other features include date and/or time insertion in text with just two keystrokes; special place markers so the user can quickly return to a specific location within the text; the ability to change from upper- to lowercase or lower- to uppercase for characters already typed; and transposition of characters allowing quick correction of typos.

The company says the software is supported by a user's manual, "written by an end user for end users." It avoids technical language, and is divided into several sections to make it easy for a novice as well as an advanced word processor to use. At the demonstration, one of the program's authors said that a user can produce his first document within 30 minutes of booting up the package.

The package will be priced under $300.

FOR MORE INFORMATION: LEADING EDGE PRODUCTS, INC., 21 Highland Circle, Needham Heights, MA 02194; (617) 449-4655.
CIRCLE 561
—*Elli Holman, Associate Editor*
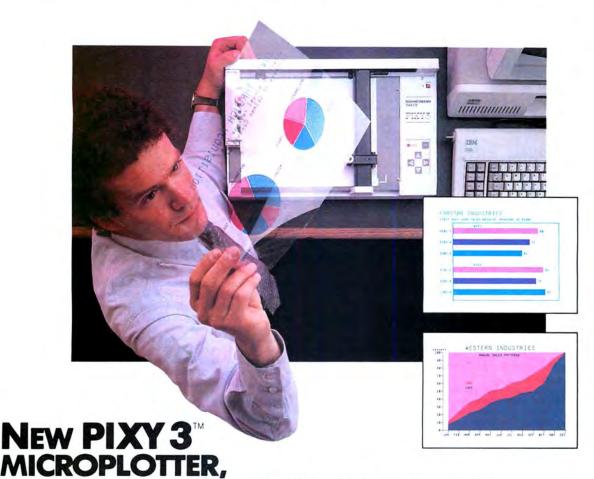
TELEPHONE MANAGEMENT SYSTEM MONITORS CALLS

A telephone-management system for use with the Apple III has been developed by Atom Inc. The Atom Reports system is designed to save money for companies with monthly telephone bills of $1500 or more. It is recommended for small business or professional firms such as law offices, accounting firms, wholesale distributors, and hotels.

Atom Reports controls telephone usage by manipulating the call detail records stored on the Apple III's disk. The system prices all calls and, upon request, generates one of 12 reports for system analysis and accounting.

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*Manufacturer's suggested retail price with parallel interface.

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Hayes

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Hayes Micromodem 100ᵀᴹ
Smartmodem 300
Smartmodem 1200

ADVISOR
Provides a comprehensive portfolio management system for active trader, money manager or investor.

Protects sensitive information sent over telephone lines so that no unauthorized person can decode files.

Permits use of normal telephone lines for accessing international Telex network.

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Aviation software simplifies planning and increases safety.

Automatically logs-on to networks, answers phone, saves incoming data, and allows it to be stored on disk, edited, and printed.

Transfers files between various micros, minis or mainframes.

Automatically answers phone in your name; receives, delivers messages.

NOTE: More and more software is being written for Hayes modems everyday. Please let us know if you would like to have *your* program included in our next software directory.

TELE-GAMMON
Allows users to play backgammon with players at distant locations.

These reports allow managers to know who and where their employees are calling, plus the time, length, and cost of each call. Managers can also determine geographic patterns of calls, and needs for WATS lines. Telephone expense budgets can be figured for each person and, for companies with more than one location, cost allocation to each branch can be figured.

The Atom system can store 60k call records; with an optional Apple Profile, it can hold 200k records. It prices local, direct-distance dialed, WATS, 800, tie line, foreign exchange, and international direct-distance dialed calls. The data base for pricing contains 42k area code and exchange combinations. Each Atom user is provided with a customized data base. Atom can also price the major common carriers such as Western Union, Sprint, and ITT.

Using Apple III graphics, Atom can produce displays of telephone use on pie charts and line graphs. This allows management to see how well their telephone system is handling call volume.

Atom allows dual use of the Apple III—when Atom is not collecting calls, you can use the computer for other functions. In addition, an optional Atom call-collector system can store 800 calls while the computer is working.

Atom Reports sells for $4500. Businesses with a telephone line capacity above 200 lines may require an Apple Profile, which is a 5Mbyte storage unit priced at $2500. The Atom call collector system costs $1995.

FOR MORE INFORMATION: ATOM INC., 25 Roxbury Rd., Scarsdale, NY 10583; (212) 362-3853.
CIRCLE 562

DEVELOP AND USE DATA BASE AND REPORT PROGRAMS WITHOUT PROGRAMMING

Execuware, a division of Aeronca Inc., announces the Next Step, which is designed to bypass the computer programmer and put the business manager in direct control of his information needs.

Next Step provides the user with the tools to build a data collection and filing system tailored to his business needs. The user defines the information or data fields to be stored by arranging them on the screen. Fields can be rearranged or changed as desired. Once the fields are set, up to 15 key data fields are selected. Using these key fields, Next Step can search and report data as required by the user.

When the number of output fields exceeds input fields, Next Step performs the calculations necessary to obtain these additional fields, and stores them in the data base.

Information that never changes but needs to be saved, such as area codes and state names, is stored but not seen when inputting.

Information entered into the data base is checked for errors, and the manager can set any field to have a number of internal checks and HELP screens to assist the operator in entering corrections.

For reports, different key or search sequences can be specified than those for the data base. Each report can have its own key sequence—allowing managers to unlock the data base to get just the information they need to make an intelligent decision.

Next Step gives managers control over both the information they need and how that information will be printed. Managers can also select page breaks, subtotaling, report length and width.

Next Step, priced at $295, runs on the IBM Personal Computer under PC-DOS 1.1 or 2.0 and with 128k main memory. It requires two floppy disk drives or a hard-disk system.

FOR MORE INFORMATION: EXECUWARE, DIVISION OF AERONCA INC., 7415 Pineville Matthews Rd., Intercontinental Plaza, Suite 300, Box 10, Charlotte, NC 28211; (704) 541-1199.
CIRCLE 563

HARDWARE/SOFTWARE COMMUNICATIONS PACKAGE OFFERS SYNCHRONOUS AND ASYNCHRONOUS PROTOCOLS

PC Express, from Intelligent Technologies International Corporation, transforms the IBM Personal Computer into a communications workstation providing electronic mail, direct access to mainframes, communications between computers, plus a variety of telephone management capabilities.

The PC Express consists of software, tutorials on disk, and a printed circuit board which plugs directly into an IBM Personal Computer or IBM-compatible computer. The package offers several protocols including synchronous and asynchronous.

There are two versions of PC Express. PC Express I allows communications with standard asynchronous mainframes and with other personal computers. It is designed for users who do not need 327X emulation. The PC Express II uses SNA to provide 327X emulation, and it provides asynchronous protocols supporting DEC VT-100/52 terminal emulation.

Both versions have an integrated telephone management system designed to enhance user and systems communications productivity. The telephone management system features answering, dialing of numbers drawn from a data-base telephone directory, and detection of busy, ringing, and voice-answered calls. A full text editor creates messages to be routed. The telephone system also has RS-232 connector which can be used with an external modem having settings up to 19.2k baud.

Programming

dBASE II™ $398

The most widely sold DMBS for micros, dBASE II defines the state of the art. An inexperienced user can create a dBASE file, begin data entry, and print out a report in minutes; the experienced programmer can create complex program systems using dBASE's unique programming language. Both can use automatic program generators and other programming tools to create applications quickly and easily.

THE DATABASE ACCELERATOR: Automatically creates menus and "intelligent" data entry screens which check input for correctness. Eliminates 80—100% of dBASE programming time! **$195**

QUICKCODE: Fox & Geller's popular generator **$185**

dGRAPH: Allows you to see your dBASE file in graphic form—a real aid to understanding **$195**

ABSTAT: Allows you to analyze your data using a wide variety of statistical tests. Can be used with dBASE files or by itself. Also does bar graphs and plots **$359**

EDIX & WORDIX . . $279

EDIX is a full-screen editor specifically designed to take advantage of the advanced features of the IBM PC; WORDIX is the best text formatter on the market. Together, they are an unbeatable combination, the finest word processor available on a micro—at an unbeatable price!

EDIX alone **$149**

WORDIX **$149**

MULTIPLAN™ $189

The world's hottest-selling spreadsheet, Multiplan™ is now setting the standard for ease of use and quality of documentation. Each of the Multiplan™ series comes complete with sophisticated training programs.

Multi-Tool Budget 'expert system': used with Multiplan, enables new users to get budgets out in minutes **$69**

Multi-Tool Financial Statement: Expert help in getting out financials. **$109**

SMARTMODEM 300 $209
1200 $509
1200B $479

These Hayes Stack Modems link your computer's RS232 serial port directly to a modular phone jack. They will dial the phone for you, and answer it as well. The Smartmodem 300 runs at 0—300 baud; for those needing higher speed, the Smartmodem 1200 can run at 1200 baud.

NEW! NEW! NEW! **Smartmodem 1200B:** for the IBM PC only **$469**

(800) 222-8811

Programming

APPLE II/II− DOS

Business

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Magic Mailer	70	49
Magic Pack Combo	225	156
Magic Window	100	75
Magic Window II	150	109
Magic Words	70	49
Magicalc	0	0
BPI		
A/P	395	320
A/R	395	320
General Ledger	395	320
Inventory	395	320
Job Cost	395	320
Payroll		320
Broderbund		
General Ledger w/AP	495	305
Payroll	395	275
Business Solutions		
Incredible Jack	179	139
Continental		
CPA #1,2,3,4 (ALL 4)	1000	609
CPA #1-GL	250	159
CPA #2-AR	250	159
CPA #3-AP	250	159
CPA #4-PAYROLL	250	159
CPA #5-		
Property Management	495	352
FCM (First Class Mail)	100	75
Home Accountant	75	52
Dakin 5		
BSNS Bookkeeping System	395	299
Budget Planner	150	112
Depreciation Planner	395	299
Datamost		
Real (Real Estate)	130	90
Tax Beater	130	90
Write On	130	99
Decision Support		
Accountant With DBCALC	149	112
Accountant	129	97
Business Accounting	255	179
DBCALC	0	20
Delta Software		
Bookkeeper Check Writer	40	29
Bookkeeper Master	90	68
Hayden		
Piewriter/Multi 80 Column	150	108
Piewriter/Standard	150	108
Highlands		
EZ Ledger	60	37
Howard		
Creative Financing 1983	195	149
Real Estate Analyzer	195	146
Insoft		
Transforth II	125	94
Kensington		
Format II	150	113
LJK		
Edit 6502	100	78
Lettr Perct W/Mail Merge	150	112
Micro Lab		
Asset Manager	200	144
Invoice Factory	200	144
Payroll Manager	300	216
Visiblend	50	37
Visifactory	75	54
Wall Streeter	300	216
Microsoft		
Multiplan	275	198
Time Manager	150	116
Muse		
Supertext 40/80 (DEAD)	175	126
Supertext Home Office	125	94
Supertext Professional	99	74
PBL		
Personal Investor	145	99
Sensible		
Sens.Speller Word Handler	125	94
Sensible Speller	125	94
Sensible Speller Pascal	125	94
Dictionary	100	70
Screenwriter II	130	85
Screenwriter Professional	200	149
Silicon Valley		
Word Handler	199	145
Sol/Sys.		
Executive Speller	75	56
Software Dimensions		
Accounting + II GR	395	289
Accounting + II AR	395	289
Accounting + II AP	395	289
Accounting + II Inventory	395	289
Accounting + II Payroll	395	289
Accounting + II SOE	395	289
Accounting + II POE	395	289
Accounting + II POS	395	289
Synergistic		
Global PGM Line Editor	65	49
Program Line Editor	40	30
Versa Computing		
Axe-Apple Extended Editor	70	53
Versawriter Exp. Pak 1	40	30
Versawriter Exp. Pak 2	40	30
Visicorp		
Business Forecasting Model	100	78
Desktop Plan	250	184
Visicalc	250	169
Visiplot	200	156

Database

AST	LIST	SALE
Versaform	389	269
Versaform-Pascal	245	180
Versaform/Corvus Hrd Disk	495	360
Broderbund		
Bank Street Writer	70	53
IUS		
Datadex	150	108
Datadex/Hard Disk	300	216
LJK		
Data Perfect	100	78
Link		
Data Fax	199	149
Micro Lab		
Data Factory	300	216
Muse		
Address Book	50	36
Sierra On Line		
General Manager II	230	168
Silicon Valley		
List Handler	90	68
Software Publishers		
PFS: File	125	94
PFS: Graph	125	94
PFS: Report	125	94
Stoneware		
DBMaster	229	148
DBMaster/Hard Disk	499	359
Utility Pak 1	99	65
Utility Pak 2	99	65
Synergistic		
Data Reporter	220	158
Data Reporter/Hard Disk	220	158
MAILING LIST DATABASE	50	38
MODIFIABLE DATABASE	80	59
Visicorp		
Visidex	250	194
Visifile	250	169

Hardware

Hayes	LIST	SALE
Micromodem II W/Term Pgm	409	289
Penguin		
Additional Fonts Char Set	20	15
Personal Computer		
Applicard 6 MHZ	595	449
80 Col Preboot Applewrite	19	15
80 Col Preboot Visicalc	49	37

Home/Education/Games

Beagle Brothers	LIST	SALE
Alpha Plot	40	28
Broderbund		
Choplifter	35	26
David's Midnight Magic	35	26
Serpentine	35	26
Star Blazer	32	24
Creative Curriculum, Inc.		
Speed Reading Courseware	99	75
Datamost		
Snack Attack	30	23
Datasoft		
Zaxxon	35	30
Eduware		
Algebra 1	40	30
Algebra 2	40	30
Algebra 3	40	30
Algebra 4	40	30
Algebra 5 & 6	50	38
Compu-Math/Arithmetic Skl	50	37
Compu Read	30	22
Compu-Spell/Data Disk 4	20	15
Compu-Spell/Data Disk 5	20	15
Compu-Spell/Data Disk 6	20	15
Compu-Spell/Data Disk 7	20	15
Compu-Spell/Data Disk 8	20	15
Compu-Spell/System	30	22
Counting Bee	30	22
Decimals	49	37
Fractions	49	37
Metri-Vert	16	12
PSAT Word Attack	49	37
Perception	25	19
Rendezvous	40	30
SAT Word Attack	49	37
Spell Bee W/Read. Primer	40	30
Statistics	30	22
Uni-Solve	25	19
Infocom		
Deadline	50	37
Starcross	40	30
Suspended	50	38
Zork I	40	30
Zork II	40	30
Zork III	40	30
ISM		
Mathemagic	90	65
Lightning Software		
Master Type	40	30
Link Systems		
Link Sampler I	60	45
Micro Lab		
English SAT #1	30	22
Learning System	150	108
US Constitution Tutor	30	22
Microsoft		
Typing Tutor II	25	19
Muse		
Castle Wolfenstein	30	23
Elementary Math	40	29
Optimized		
Speed Read Plus	60	43
Sierra On Line		
Cannonball Blitz	35	26
Jaw Breaker	30	23
Time Zone	100	69
Ultima	60	45
Sir-Tech		
Wizardry	50	35
Sirius		
Kabul Spy	35	26
Spinnaker		
Face Maker	35	25
Strategic Simulations		
Cytron Masters	40	30
Synergistic		
Atlantis	40	30
Stargazer's Guide	30	23
Ultrasoft		
Mask of the Sun	40	30

Language

Datasoft	LIST	SALE
Basic Compiler	100	75
Lisp Interpreter	125	94
IUS		
Fourth Development System	140	101
Insoft		
ALD System II	75	56
Microsoft		
Applesoft Compiler (TASC)	175	119
Mumath/Musimp (ADIOS)	250	194
Sensible		
Applesoft + Struc. Basic	40	30
Sierra On Line		
EPF IV	80	56
Softech		
Basic Compiler & Runtime	225	169
UCSD P-System set	625	469

Synergistic

INTEGER	LIST	SALE
BASIC COMPILER	150	108

Utility/Comm/Graphics

Avant Garde	LIST	SALE
Ultra Plot/DIF/Datagraph	99	71
Beagle Brothers		
Apple Mechanic	30	22
Beagle Bag	30	23
DOS Boss	24	17
Double Take	35	27
Double Take	35	27
FRAME UP	30	23
Flex Test	30	23
Pronto DOS	30	23
Utility City	30	22
Computer Station		
Combined Enhanced Graphics	55	40
Crane		
Menu Generator	40	29
Datasoft		
Micropainter	35	25
Hayes		
Terminal Program	100	75
Highlands		
CRAE	40	30
Ius		
Easy Mover	100	75
Insoft		
Electric Duet	30	23
Graforth II	75	56
International Software Marketing		
Graphmagic	90	65
Link Systems		
Data Link	100	75
Link Disk	70	51
Link Index	195	149
Link Video	55	42
Lotus		
Executive Briefing System	199	149
Micro Lab		
Painter Power	40	30
Muse		
Dataplot	60	43
Omega Microwave		
Inspector	60	49
Locksmith	100	75
Penguin		
Comp Graphics/Apple Table	120	86
Complete Graphics System	70	50
Graphics Magician	60	45
Special Effects	40	30
Special Effects Apple TAB	70	50
Phoenix		
ZOOM Graphics	50	38
Sensible		
Bug, The	50	32
Build Using	30	23
DOS Plus	25	19
Disk Organizer	30	23
Disk Recovery	30	23
Multi Disk Catalog	25	19
Quickloader	25	19
Super Disk Copy	35	26
Sirius		
Pascal Graphics Editor	100	75
Softech		
Xenofile	50	39
Southeastern		
Data Capture	65	49
Data Capture/Superterm	90	65
Data Capture/Smarterm	90	65
Data Capture/Super Serial	90	65
Data Capture Videx	90	65
Southwestern Data		
ASCII Express Professionl	130	89
Printographer	50	38
Stoneware		
Graphics Proc. Sys. (STD)	69	52
Graphics Proc. Sys. (Prof)	179	129
Synergistic		
Higher Graphics II	30	26
Vdiex		
Videoterm Utilities Disk	37	28
Visicalc Mem Ex W/Preboot	89	67
Visicorp		
Visilink	250	194
Visiterm	100	79
Visitrend/Plot	300	234
Winner's Circle		
Disk Encryption	60	45

APPLE HARDWARE

Hardware

Hayes	LIST	SALE
Micromodem II	379	259
Kensington		
System Saver Fan	90	69
Kraft		
Joystick	65	49
LJK		
Lower Case Char Gen	25	19
Micro-Sci		
A2 3ST Disk Drive	479	329
Microsoft		
16K RAM Card	100	69
Premium System	695	489
Softcard	345	219
New Premium Card	495	369
TG		
Joystick	60	45
Selectaport	60	45
Trackball	65	49
Videx		
Enhancer II	149	119
Function Strip	79	65
Inverse Character Set	29	24
Lower Case Chip (REV 0-6)	35	29
Lower Case Chip	29	24
Micromodem Firmware	29	24
Soft Video Switch	35	29
Videoterm with Softswitch	375	239
Videoterm Switchplate	19	16
Ultraterm	379	289

Utility/Comm/Graphics

Eastside	LIST	SALE
Wildcard	130	109

APPLE III

Business

Datamost	LIST	SALE
Write On	130	99
Insoft		
Transforth III	125	94
Visicorp		
Business Forecasting Model	100	78
Desktop Plan	300	234
Visicalc Advanced	400	312

Database

AST	LIST	SALE
Versaform	495	371
Link Systems		
Data Fax	249	187
Software Publishers		
PFS: File	175	129
PFS: Graph	175	129
PFS: Report	125	94

Home/Education/Games

Link Systems	LIST	SALE
Link Sampler I	60	45

Language

Insoft	LIST	SALE
ALD System III	75	56

Utility/Comm/Graphics

Link Systems	LIST	SALE
Link Index	195	149
Link Video	55	42

APPLE IIe

Most Apple II products run on the IIe (call for details). Products below are specially designed for the IIe.

Business

Sierra On Line	LIST	SALE
Screenwriter II	0	0
Software Dimensions		
Accounting + IIE GL	395	289
Accounting + IIE AR	395	289
Accounting + IIE AP	395	289
Accounting + IIE Inventor	395	289
Accounting + IIE Payroll	395	289
Accounting + IIE SOE	395	289
Accounting + IIE POE	395	289
Accounting + IIE POS	395	289
Visicorp		
Visicalc	250	189

Database

Software Publishers	LIST	SALE
PFS: File	125	94
PFS: Graph	125	94
PFS: Report	125	94

The PC Express package provides asynchronous communications with most mainframes, including line-oriented TS0 and mainframes running under VM. Asynchronous protocols allow the personal-computer user to access public data bases, and electronic mail can be routed through Western Union, The Source, CompuServe, or to any personal computer capable of asynchronous communications.

Data can be sent in both directions simultaneously. Data received is displayed on the monitor, stored on disk, or printed out as hard copy. A personal computer can serve as a host to another local or remote personal computer or to an ASCII terminal. Any program stored on the host computer can be called, run, and modified either locally or remotely.

To link the personal computer with the world via telephone lines, the user plugs wires from the telephone and wall jack into two telephone connectors.

The PC Express I—including printed circuit board, software and manuals for telephone management, and asynchronous communications—is priced at $895. The PC Express II—which has all the capabilities of PC Express I plus SNA/327X emulation—is priced at $1295.

FOR MORE INFORMATION: INTELLIGENT TECHNOLOGIES INTERNATIONAL, 151 University Ave., Palo Alto, CA 94301; (415) 328-2411.
CIRCLE 564

SMART TERMINAL PROGRAM
COMBINES SPEED AND FLEXIBILITY

MicroTerm, a smart terminal program from Micro-Systems Software, allows the user to continue to receive data while off line. "You can adjust video width, turn on the printer, open the buffer, and do many other things," says Micro-Systems's general manager Mark Lautenschlager, "and then return to the terminal mode without missing any information received in the interim."

The package features both standard ASCII and "error freequote" direct file transmission. And its MacroKey function provides 10 user-defined keys capable of transmitting up to 63 characters at a single stroke.

"All versions can operate at 1200 baud and in some cases up to 9600 baud, without insertion of null characters," Lautenschlager says. "With the advent of 1200-baud modems and with many popular host systems unable to adjust for slower terminals, the speed of Micro-Term is an important consideration for office and home users."

MicroTerm includes translation tables which allow the program to emulate any type of terminal hardware. Its dialing menu lets the user auto dial any of the 10 preset numbers at the touch of a key. Additional numbers can be kept in other configuration files and loaded easily.

MicroTerm supports most major brands of modems including auto dial in both command and pulse dial modes. It is available for TRS-80, IBM, Zenith, and Apple personal computers, and is priced at $79.95.

FOR MORE INFORMATION: MICRO-SYSTEMS SOFTWARE INC., 4301-18 Oak Circle, Boca Raton, FL 33431; (800) 327-8724 and in Florida, (305) 983-3390.
CIRCLE 565

GENERAL PURPOSE SYSTEM LETS USERS
DEVELOP THEIR OWN APPLICATIONS

Questext III, from Information Reduction Research, is designed for business people, educators, scientists, and systems developers. It is a general purpose system for organizing, storing, and retrieving textual information.

The package's manufacturers say Questext III is neither a word-processing system nor a data-base management system, but rather a program with a unique set of aims that meet many recognized needs and allow old problems to be approached from a new perspective. Questext III organizes text into tree-like menu structures without programming and debugging, and allows users to save programming costs by developing their own applications.

Questext III is 100 percent menu driven and includes HELP and SHOW facilities among its inventory of commands. Prompts and other aids are designed to accommodate all user levels.

The program requires an IBM Personal Computer or a CP/M-based system and costs $299.95; an electronic tutorial and five applications are available for $29.95.

FOR MORE INFORMATION: INFORMATION REDUCTION RESEARCH, 1538 Main St., Concord, MA 01742; (617) 369-5719.
CIRCLE 566

ALL-IN-ONE INFORMATION
MANAGEMENT PACKAGE

KnowledgeMan from Micro Data Base Systems is an all-in-one information management package with spreadsheet capabilities. It is similar to other systems such as 1-2-3 and Context MBA, but unlike these packages, KnowledgeMan is organized around its relational data management capabilities rather than its spreadsheet capability.

KnowledgeMan is primarily a decision support tool but it can also be a key component in a distributed processing system. The package's structured programming language makes it suitable for building end-user application systems.

According to product manager David Bartkus, this approach yields a functionally superior design with numer-

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The CP/M WorkShop is the fastest way to get friendly with your personal computer.

The CP/M WorkShop doesn't just EXPLAIN how to control your computer—it PERFORMS the important commands while you watch.

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Runs on Xerox , DEC, Osborne, Kaypro, Apple (w/Z80), TRS-80, Eagle, InterSystems, and dozens more. Ask your retailer for the CP/M WorkShop or call DATASCAN direct. Coming attractions include workshops for MSDOS (PCDOS), CP/M-86.

System Requirements: CP/M—80 (version 2.2); 48K available memory: 24x80 cursor-addressable display. Setup program for most terminals (no special graphics requirements).

*CP/M is a trademark of Digital Research, Inc. MSDOS is a trademark of Microsoft, Inc. PCDOS is a trademark of IBM Corp. "WorkShop," "Mr. C R T," and computer character graphic are trademarks of Datascan, Inc. ©Copyright 1983, Datascan, Inc. All rights reserved.

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CIRCLE 133

ous capabilities. "A major implication of the true integration of the spreadsheet function with a data manager is that a cell (intersection of a row and column in the spreadsheet) may actually be updated automatically by defining that cell to include data management commands, for example, or queries on one or more data tables. The user doesn't have to worry about updates every time he uses the spreadsheet. This means many spreadsheets can use the same information and updates need only be made once."

Another advantage of the integration of the spreadsheet with the data manager is that the data can be safeguarded with the same security features—a user can't access information unless he has permission to do so.

KnowledgeMan also features ad hoc inquiries, statistical analysis, screen management, printed forms management, and programming language functions.

Suggested retail price for the package is $500. It is available for PCDOS, MSDOS, and CP/M-86-based systems.

FOR MORE INFORMATION: MICRO DATA BASE SYSTEMS INC., P.O. Box 248, Lafayette, IN 47902; (317) 448-1616.
CIRCLE 567

DATA-BASE MANAGEMENT PROGRAM IS FILE COMPATIBLE WITH VISICALC AND WORDSTAR

Continental Software's Megafile is a data-base management software program for the IBM XT and the IBM Personal Computer. The program combines filing, graphics, and report capabilities in a single package. It is also file compatible with VisiCalc and WordStar, the two most widely used personal computer electronic-spreadsheet and word-processing programs.

"The majority of data-base programs either do not offer the user three-in-one capability or are very expensive for the average buyer," says Hank Scheinberg, executive vice president. "Furthermore, they are too complicated for the average person. Our program is written in plain English and should be understandable to anyone."

The package retails for $195.

FOR MORE INFORMATION: CONTINENTAL SOFTWARE, 11223 South Hindry Ave., Los Angeles, CA 90045; (213) 417-8031.
CIRCLE 568

NEW INFORMATION MANAGEMENT SYSTEM GEARED FOR PROFESSIONALS

SR Corporation has introduced OmniFile, a new information management system for the needs of professionals and their staffs. Using OmniFile, professionals can develop a data file and report system that meets their special requirements.

ZERO TO MULTIPLAN™ IN 5.2 MINUTES.

FINANCE OR ACCOUNTING WORKSHEETS FAST.

Gentlemen, start your computers.

Time: 0

Select budget intervals.

Time: 0.5

Enter sales revenue.

Time: 1.0

Enter selling expenses.

Time: 1.5

Your sales budget on the Multiplan electronic worksheet-in record time.

Time: 5.2

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For example, the Multi-Tool Budget expert system creates seven inter-related ·

Multiplan worksheets for a total budget planning and control environment.

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The result: a tailored electronic worksheet that helps you make high quality decisions.

That's just what you'd expect from Microsoft. The people who let you concentrate on your business rather than on your computer.

Ask your computer dealer to let you test drive the new Multi-Tool expert systems. Better tools that help you put your business in first place.

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KEYS TO SUCCESS

Whether you have a small retail company, manage a service agency or run a cattle ranch, you have to do something else well to build a business—*manage money.*

You've got to analyze cash flow, see trends and forecast profitability in a time and cost effective manner.

The right fit.

A computerized accounting system makes sense, but finding the right software is important. The "home checkbook" programs are easy to use but they don't have the advanced reporting capabilities you need. And many small businesses just don't need the complexity or the cost of the modular systems.

Practical Accountant is a single entry, small business accounting program that comes complete in one package. It's friendly enough to balance your checkbook, yet sophisticated enough to give you the kind of money management information you need for a successful business.

We could have called it "Accounting Made Easy".

Practical Accountant is designed around fundamental accounting procedures. Even if you don't know much about accounting it is an ideal program.

The manual explains basic accounting terminology and provides a comprehensive tutorial. It will take you step-by-step through the process of setting up a complete, single entry accounting system you can begin using right away.

It's quick to learn and convenient to use.

The program guides you with easy-to-use menus and provides on the screen prompting. "HELP" is never more than a keystroke away. It even does some of your work for you like organizing entries in date order even if you don't.

It's very flexible. You set it up to fit your business.

Practical Accountant allows you to set up your "Chart of Accounts" (income and expense categories) with up to 50 categories, 300 sub-categories and with 20 tax type definitions—all defined by you. The manual shows you how to set up an accounting system for a small business, complete with samples.

Cash Flow Reporting— money management information.

Perhaps the most valuable feature of the program is the cash flow reporting capability. You can look at cash flow by category, by sub-category and by tax type to analyze profitability, tax consequences and general performance. All of your reports are professionally formatted and you have access to profitability information that leads to sound business management.

There is more to this success story.

If you would like to know more about Practical Accountant your dealer can give you a great demonstration and a brochure with a more complete story, or call Softlink TOLL FREE at 800 633-6300 (in CA 800 222-1244) and we will send you the brochure.

Practical Accountant
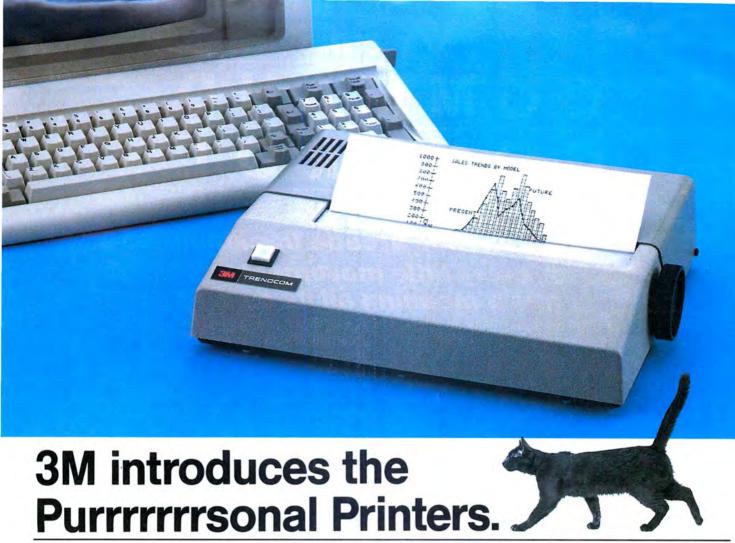
Single entry, small business accounting for the Apple IIe

$149.95
suggested retail

3M introduces the Purrrrrrrrsonal Printers.

Quiet, high-quality printers at prices that won't scratch holes in your pocketbook.

$299, manufacturer's suggested retail price, for a printer that puts 80 columns of full-size text, 136 columns of compressed print, and computer-generated graphics on crisp white paper. Or $249 for the 40/80-column model.

Price is about the only way that our new 3M Silent PC Printers draw attention to themselves. At home or in the office, they're virtually inaudible since their non-impact electronic printing elements skim across the paper with none of the monkeylike chatter that you hear from ordinary matrix printers. Result: Less distraction for you, and less disturbance to others.

Our Silent PC Printers differ from most other sensibly-priced printers in another way, too. They print sharp, black characters from one end of the paper roll to the other, since there's no ribbon to wear out.

Maintenance is kept to a minimum since 3M Silent PC Printers have only two moving parts: the pinless printhead and the DC stepper-motor paper drive. They come with a one-year warranty (90 days on Printhead), and they're made in the U.S.A. by 3M, a company whose name is synonymous with quality.

Both serial and parallel interfaces are available. For literature on 3M Silent PC

40/80-column Silent PC Printer

Printers, and for the name of a dealer who can give you a demonstration, call 800-328-1684 toll-free. (In Minnesota, call 800-792-172.) In Canada, call 1-800-268-9055 and ask for operator #11. Or, if the cat's got your tongue, mail the coupon instead.

Mail to:
3M Business Communication Products Division
Attn.: G. Collins
3M Center—Building 216-2N
St. Paul, MN 55144

☐ Please send literature on the new 3M Silent PC Printers and tell me where I can buy them.
☐ I'd like a demonstration soon.

Name _____

Title _____

Phone (___) _____

Company _____

Address _____

City _____

State _____ Zip _____

3M Business Communication Products Division

3M hears you ...

3M

No knowledge of programming is necessary to develop a customized information management system using OmniFile. According to David Lloyd, Omnifile product manager, the program was designed to be extremely flexible and easy to use, allowing the professional to concentrate on his work instead of his computer. As Lloyd states, "Professionals are concerned with information, not programming."

The OmniFile user's manual includes an extensive "How to" section that includes examples of how the program can be used to improve productivity and decision-making in a variety of field. In addition, it includes instructions on how to implement a number a specific business applications, including case docketing for attorneys, client dossiers for insurance professionals, salesperson productivity reports for sales managers, appointment scheduling for doctors, and personnel files for business managers.

OmniFile's report-writing feature also appears to be quite friendly. The user can select information desired for reports from an on-screen list of topics. The desired report can then be viewed on the screen or printed on hard copy.

OmniFile can generate reports with up to four sort levels and totals, subtotals, counts and averages for each level. Calculated fields and multiple conditions are also supported. With these features, user-friendliness is again a major concern. Lloyd says, "Professionals know intuitively how they want their reports to look, but they may not know the computer language that refers to what they want. OmniFile uses plain English instructions, words that non-computer people can understand."

OmniFile runs on the IBM Personal Computer and other machines using the MS-DOS or CP/M-86 operating systems. It requires 128k of RAM and two disk drives. A version for hard disk systems is also available. The manufacturer's suggested retail price is $425.00

FOR MORE INFORMATION: SSR Corporation, 1600 Lynell Avenue, Rochester, NY, 14606; (716) 254-3200

CIRCLE 269

GEMS OF WISDOM

Avoiding Disk Limit Errors

While using File Manager Plus on my Atari, I had one disk filled to near capacity with inventory records. I then decided I needed to add one more field per record. By following the File Manager instruction manual, I added the field I wanted and punched "SAVE END" to quit the program for the day. But I received an "INDEX TABLE FULL" message. I reindexed from my original 10-letter index to five to three to one with the same error message each time. I even tried an index length of zero, but the program wouldn't accept it.

The next thing to try was to delete a few pages of records to gain the needed space. But even after I'd made the deletions I still got the "INDEX TABLE FULL" message. I went back to the instructions and found that once File Manager has allocated space for records, it won't give it up until you run the copy file procedure. I tried to run this procedure, only to find it cannot be run when the index table is full.

I gave up trying to find an easy solution. I went back and deleted the recently added field. Then I was able to run the copy file function and reinsert the wanted field, then RUN, SAVE, END, and QUIT.

The moral of this is: Never add an extra field if you are at or near the disk limit on File Manager.

Ted Holland
OOLAGAH, OK

This Gem of Wisdom wins $25 for Ted Holland. If you have an anecdote, tip, or secret to share, send it (up to 250 words) to Gems of Wisdom Editor, Personal Computing, *50 Essex St., Rochelle Park, N.J. 07662.*

COMING IN FUTURE ISSUES

Extending Your Work Day

"Everybody" brings work home. But how many people do the work once they've got it there? Is it better to go to the office early, or stay late? The November issue of *Personal Computing* answers these questions and looks at how a computer lets you extend your work day to get the job done.

The "What Else" On Self-Development

If you're looking for an answer to the question, "What else can I do with my personal computer?" try learning a foreign language, or learning about music, or sharpening your vocabulary skills, or . . . . Our self-development story tells you how to get started, and more.

Networking Considerations

If you're part of a large corporation, you've probably considered getting a network of personal computers to make your department run more smoothly. But it's easy to throw up your hands in despair when confronted with all the terminology and different network schemes. Our October networking story will help you sort through the confusion.

Dot-Matrix Dissertations

Sorry to take exception with your answer to the question about thesis-quality print from a dot-matrix printer (Answers, July 1983, page 35). Anyone who is willing to assume a thesis committee will *not* be "curmudgeonly" is unnecessarily risking his masters degree. The same applies to anyone considering the use of a dot-matrix printer for a dissertation. Since the production rules for a dissertation and a thesis tend to be similar, the regulations for the doctoral dissertation tend to apply.

Both the masters thesis and the doctoral dissertation are rites of passage, and as such embody traditions that need not be overtly logical. While some dot-matrix printers can produce print of fine quality, it's near-letter quality, and not letter-quality per se. A dissertation committee rules on the content of a dissertation; the container (the actual manuscript) is judged by the school or departmental dissertation secretary. And the vast majority of same refuse to accept dot-matrix copy. (There may be some who do, but not in any of the major universities in New York City.)

Should someone wish to use a dot-matrix printer, I would suggest not merely checking print samples on his own, but taking those samples to the school dissertation secretary for official evaluation. A further recommendation is

"Hayden's *Personal Computing* magazine's accuracy policy: to make diligent efforts to insure the accuracy of editorial material. To publish prompt corrections whenever inaccuracies are brought to our attention. Corrections appear in 'Letters.' To encourage our readers as responsible members of our business community to report to us misleading or fraudulent advertising. To refuse any advertisement deemed to be misleading or fraudulent."

to get approval *in writing*. If approval is not forthcoming, a number of options still exist.

There are now a number of letter-quality, daisywheel printers on the market which do super- and subscripts, and whose prices are comparable to the dot-matrix printer mentioned. Their speed of output may not be, but when compared to the loss of time involved when a dissertation manuscript is rejected and must be retyped, cps is not an issue.

Another option available is to rent a daisywheel printer for a month, which is ample time for producing penultimate and final (post-defense) drafts. A remaining option is to have a professional typist or word processor produce the final manuscript. But if your questioner already has a dot-matrix printer, its output will probably be acceptable for preliminary drafts of both proposal and dissertation and/or thesis.

A. Avrama
THE ACADEMIC FACTOR
NEW YORK, NY

COMPUTER LAW FOR THE LAYMAN

I thought your June 1983 article by Richard L. Bernacchi and Joel Rabinovitz concerning the tax benefits of buying a personal computer was beneficial for laymen (Law, page 137). However, by attempting to put complicated tax material in English, I think the authors unintentionally omitted two items of importance which should be considered by anyone buying a personal computer for business or investment purposes.

First, in discussing the investment tax credit under ACRS the authors neglected to mention that an 8 percent investment tax credit is available on five year property, which does not require a basis reduction for depreciation purposes. And second, in discussing the deduction of up to $5000 for the cost of equipment, the authors imply that the investment tax credit is not available. It's true that the investment credit is not available for the expensed portion, but if a computer

item costs more than $5000, the investment tax credit is available for the difference. For example, a computer item costing $10,000 is eligible for investment tax credit on the remaining $5000 of depreciable cost if the full expensing election has been taken.

Edward G. Reifenberg
WILSON, PRICE, BARRANCO & BILLINGSLEY
MONTGOMERY, AL

IF YOU DON'T HAVE THE TIME . . .

Your June 1983 cover story "Time is of the Essence" (page 56) indicated that there is little usable software available for time and schedule management. This is no longer true.

I have been using an Epson QX-10 and the VALDOCS (for valuable documents) software integrated together and find that the set up works as a time and information management system. If I'm using my word processor and need to inquire about, or set up, an appointment in response to a telephone inquiry, all I have to do is push the function key labled SCHED and the system automatically marks the place on the word processor and brings up the calendar for the desired date. The SCHED function allows me to enter an appointment, reserve a block of time, reformat the appointment time divisions, enter notes for a specific date (up to 24 lines of 80 columns), initiate a timer for an event or meeting, and print an itinerary. There is no need to change disks or reboot the system.

The system provides an integrated word processor, a filing system indexed up to 16 levels of key English words, electronic mail, an address file, mailing labels, a calculating mode, business graphics, and a scheduling function. Bar graphs and calculations can also be prepared and then inserted into a word-processing document.

I really enjoy your magazine. Keep up the good work.

H. Wayne Olive
STANARDSVILLE, VA

Many of *Personal Computing's* advertisers will send further information about their products and services. Simply circle (on the readers' service card) the bold number that appears to the left of the advertiser's name in the list below. If there is no number listed on the left, kindly write or call the advertiser. Advertisers listed after page 271 are found in our special subscriber section, Showcase of Products.

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wasn't created by IBM.

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TRS-80® III 16K

$1355*
IBM® PC 64K

A personal computer is supposed to be a computer for persons. Not just wealthy persons. Or whiz-kid persons. Or privileged persons.

But person persons.

In other words, all the persons whom Apple, IBM, and Radio Shack seem to have forgotten about (including, most likely, you).

But that's okay. Because now you can get a high-powered home computer without taking out a second mortgage on your home.

It's the Commodore 64. We're not talking about a low-priced computer that can barely retain a phone number. We're talking about a memory of 64K. Which means it can perform tasks most

other home computers can't. Including some of those that cost a lot more. (Take another look at the three computers above.)

By itself, the Commodore 64 is all the computer you'll ever need. Yet, if you do want to expand its capabilities some day, you can do so by adding a full complement of Commodore peripherals. Such as disk drives. Modems. And printers.

You can also play terrific games on the Commodore 64. Many of which

will be far more challenging than those you could ever play on a game machine alone.

And as great as all this sounds, what's even greater-sounding is the price. It's hundreds of dollars less than that of our nearest competitor.

So while other companies are trying to take advantage of the computer revolution, it seems to us they're really taking advantage of something else: Their customers.

*Manufacturers' suggested list prices as of March 20, 1983. Monitor included with TRS-80 III only. Commodore Business Machines, P.O. Box 500R, Conshohocken, PA 19428; Canada–3370 Pharmacy Avenue, Agincourt, Ont., Can. M1W 2K4.

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C= commodore COMPUTER

CIRCLE 14

THE COMMODORE 64™ UNDER $600.
You can't buy a better computer at twice the price.